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THE JOURNAL  
OF  
SOUTH AFRICAN BOTANY

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# THE JOURNAL OF SOUTH AFRICAN BOTANY.

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JOURNAL  
OF  
SOUTH AFRICAN BOTANY  
VOL. VIII. PART I.

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THE GENUS PHYLICA, LINN.

BY N. S. PILLANS.

The genus *Phylica* is confined to Africa, south of the equator, and to certain islands in the South Atlantic Ocean and Indian Ocean. Most species occur and are endemic in the south-western parts of the Cape Province, where many are restricted to small areas. Two are endemic in Natal and Zululand and four in eastern Tropical Africa. No species has been recorded from the west side of Africa. The most widely distributed species is *P. paniculata*, which occurs along a belt of mountainous country extending from the Worcester Division, in the south, northwards to the Chimanimani Mountain in Southern Rhodesia. In the Cape Province all species occur only in association with other plants of the Cape Flora, mostly at altitudes between 1,000 and 5,000 feet, a few reaching to 7,000 feet, which is nearly the limit for the genus. Except for a few species which thrive in the shelter of larger plants or in moist ravines, the majority show a preference for exposed and comparatively dry situations. The duration of the life of individuals in different species growing in like conditions and subjected to burning depends upon the habit of growth of each species. For example, *P. imberbis* and *P. plumosa* which are aided by a rather stout rootstock in surviving fires, and *P. strigosa* and *P. pubescens* which, as in the majority of species, never form a stout rootstock and therefore easily succumb to burning.

It is remarkable that stipules are present in only one species, *P. stipularis*. At the base of the flower-head the stipules widen con-

siderably and are united with the bases of the reduced leaves. In the flower-head they are united with the bases of the bracts, which are clearly modified leaves.

The genera *Soulangia* and *Trichocephalus*, established by Brongniart in 1826 to receive species which he had removed from *Phyllica*, could not be retained when newly discovered species were found to possess characters which connected those genera with *Phyllica*. For the same reason the genera *Petalopogon*, *Tylanthus* and *Walpersia* established by Reissek in 1839-40 and the genus *Calophyllica* proposed by Presl in 1884 have not been retained. It has not even been found possible to satisfactorily group the species into sections.

There is evidence of three lines of evolution within the genus, a gradual change from the racemose inflorescence through the spicate to the capitate inflorescence, the lengthening of the calyx-tube, and the reduction in size of the petals or their complete disappearance. These developments, however, do not show a uniform progress in all species. A capitate inflorescence may contain flowers with characters which are primitive in the genus. A highly developed calyx-tube may be accompanied by well-developed petals of an ancestral type. But diminutive petals as well as the absence of petals are characters associated only with a highly developed calyx-tube.

In the present work the measurements given of the leaves are taken from the base of the petiole to the apex of the lamina, the length of the petiole being given separately. The measurements of the length of the flowers are taken from the base of the ovary to the tips of the sepals while in an erect position. The descriptions of the shapes of the anthers apply only to anthers with closed cells.

All the collectings recorded in this work have been examined by me, and all the descriptions have been compiled with the use of dried material only unless otherwise stated. A mark of exclamation (!) indicates that I have seen the type of the species.

I gratefully acknowledge the facilities granted me for making use of the herbaria and libraries of the Royal Botanic Gardens, Kew, the British Museum and the Linnean Society. I have also to acknowledge the loan of material from the following institutions: Botanisches Museum, Berlin; Museum d' Histoire Naturelle, Paris; Botaniska Avdelningen, Riksmuseum, Stockholm; Botaniska Museet, Uppsala; Trinity College, Dublin; National Herbarium, Pretoria; South African Museum, Cape Town; Albany Museum, Graham's Town; Kirstenbosch Herbarium, Newlands, Cape Province. The publication of the accompanying illustrations has been made possible by kind permission of Prof. Compton for their being drawn by Miss M. Walgate.

PHYLICA, Linn., *Sp. Pl.* 195 (1753) et *Gen. Pl.* ed. 6, 105 (1764); [**Philyca**, Linn., *Gen. Pl.* 58 (1737); ed. 2, 82 (1742); ed. 4, 66 (1752); ed. 5, 90 (1754): **Phylica**, Miller, *Dict.* ed. 4 (1741) partim; ed. 5 (1747) partim; ed. 6 (1752)] *Syst. Nat.* ed. 10, ii, 938 (1759); *Sp. Pl.* ed. 3, i, 283 (1764); *Syst. Nat.* ed. 12, ii, 180 (1767); Miller, *Dict.* ed. 8 (1768); Linn., *Syst. Nat.* ed. 13, ii, 180 (1770); Linn., *Syst. Veg.* ed. 13, 196 (1774); Linn., *Gen. Pl.* ed. 7, 108 (1778); Linn., *Syst. Veg.* ed. 14, 235 (1784); Gaertn., *Fruct.* i, 114 (1788); Linn., *Gen. Pl.* ed. 8, 142 (1789); ed. 8 (9) 22 (1791); Lam., *Illus.* ii, 76 (1793); Linn., *Syst. Veg.* ed. 15, 246 (1797); Willd., *Sp. Pl.* i, 1108 (1798); Poir. in *Lam. Encycl. Bot.* v, 286 (1804); Willd., *Enum. Hort. Berol.* 251 (1809); Du Mont de Courset, *Bot. Cult.* ed. 2, vi, 271 (1811); Thunb., *Fl. Cap.* ed. Schultes 199 (1823); Brongn., *Mem. Rham.* 68 (1826); Linn., *Sp. Pl.* ed. 9 (10) 204 (1830); Don, *Gen. Syst.* ii, 40 (1832); Meisn., *Gen.* 70 (1837); Harv., *Gen.* 62 (1838); A. Dietr. in *Otto et Dietr. Allg. Gartenz.* vii, 378 (1839); Richter, *Syst. Gen. et Sp.* 211 (1840); Reissek in *Endl. Gen.* 1100 (1840); Sond. in *Harv. et Sond. Fl. Cap.* i, 479 (1860); Harv., *Gen.* ed. 2, 57 (1868); Engl., *Pflanzenw.* ix, 313 (1921): **Alaternoides**, Adans., *Fam.* ii, 304 (1763): **Trichocephalus**, Brongn., *Mem. Rham.* 67 (1826); in *Ann. Sc. Nat.* ser. 1, x, 374, tab. 17, fig. 1 (1827); Don, *Gen. Syst.* ii, 40 (1832); Meisn., *Gen.* 70 (1837); A. Dietr. in *Otto et Dietr. Allg. Gartenz.* vii, 393 (1839): **Soulangia**, Brongn., *Mem. Rham.* 70 (1826); in *Ann. Sc. Nat.* ser. 1, x, 377 (1827); Don, *Gen. Syst.* ii, 42 (1832); Lindl. in *Bot. Reg.* sub tab. 1498 (1832); Meisn., *Gen.* 70 (1837); A. Dietr. in *Otto et Dietr. Allg. Gartenz.* vii, 380 (1839); Reissek in *Endl. Gen.* 1101 (1840): **Petalopogon**, Reissek in *Endl. Nov. Stirp. Decas* 82 (1839); in *Endl. Gen.* 1100 (1840): **Walpersia**, Reissek in *Endl. Gen.* 1100 (1840): **Tylanthus**, Reissek in *Endl. Gen.* 1101 (1840): **Calophyllica**, Presl, *Bot. Bemerk* 39 (1844) absque descr.; Walpers, *Ann. Bot. Syst.* i, 195 (1848-49).

Undershrubs, shrubs or rarely small trees with ascending terete branches. Leaves alternate, simple, consisting of a short petiole and an ovate, lanceolate, oblong or linear lamina mostly with revolute margins covering part or the whole of the lower surface; upper surface convex or rarely almost flattened, partly or entirely smooth or minutely or coarsely tubercled, mostly at first pubescent and becoming glabrous, rarely persistently pubescent, rarely with evident secondary nerves; lower surface tomentose. Stipules present in one species, free, simple. Flowers in heads, spikes or racemes or solitary in the axils of the upper leaves. Bracts usually present, small or sometimes conspicuous and exceeding the flowers. Bracteoles usually 2, sometimes many, rarely absent. Calyx-tube cyathiform, campanulate, urceolate, cylindric o:

obconic, terete or more or less pentangular, partly or entirely clothed outside with persistent or deciduous hairs or glabrous within and without, rarely pubescent within. Calyx-lobes erect-spreading, often somewhat recurved above the middle, ovate, deltoid, lanceolate or linear, acute or acuminate; upper surface flattened and with a prominent median nerve or with a short keel at the apex, or flattened at the base and convex above, glabrous or occasionally pubescent on the convexity or bearded on the lower half; lower surface more or less clothed with persistent or deciduous hairs, very rarely glabrous. Disc usually distinct, entire, lining the base or side of the tube or fleshy and almost filling the tube, occasionally annular. Petals 5, rarely fewer or absent, inserted at the mouth, on the upper half or at the middle of the calyx-tube, small, setaceous, linear, lanceolate, oblanceolate, spathulate or ovate, or consisting of a lamina narrowed into a claw-like base; lamina rotundate or orbicular, usually cucullate, occasionally galeate or calyptriform; claw mostly linear, oblong or cuneate. Stamens 5, inserted immediately below the petals; filaments very short, dorsally compressed; anthers reniform or ovate, 1- or 2-celled. Ovary inferior, obconic or narrowly turbinate, glabrous or more or less hairy, 3-chambered, ovules solitary, erect. Style simple. Stigma minutely 3-lobed or pulvinate. Fruit obovoid or rotundate, mostly with a longitudinal impression between the chambers, rarely ribbed, mostly crowned with the persistent base of the calyx, glabrous or hairy, mostly capsular and opening on the inner face, rarely developing upwards within and above the base of the calyx. Seeds rotundate, somewhat dorsally compressed, more or less 3-sided, smooth; funicle short, dilated into a lobed aril embracing the base of the seed.

## KEY TO THE SPECIES.

\*Petals present :

†Petals, in their entirety, setaceous, acicular, linear, oblanceolate-linear, lanceolate, oblanceolate, spathulate or ovate, or consisting of a lamina and a basal claw, the lamina linear, lanceolate, ovate-lanceolate, ovate, rotundate or orbicular, often eoneave or channelled on the inner side and slightly incurved at the apex but never cucullate :

Stipules present . . . . . (111) *stipularis*

Stipules absent :

‡Petals oblanceolate or spathulate, or consisting of a claw and an oblanceolate or rotundate lamina :

Petals with conspicuous hairs on the upper margin or on the upper portion of the dorsal surface :

Petals consisting of a rotundate lamina and very narrow claw . . . . . (137) *trachyphylla*

Petals entirely oblanceolate :

Leaf-lamina linear, rounded at base . . . (140) *Maximiliani*Leaf-lamina ovate to lanceolate, widely cordate at base . . . . . (127) *spicata*, var. *piquetbergensis*

- Petals without conspicuous hairs :
- Flowers 8.5—9 mm. long :
- Sepals bearded on the inner surface . . . . (148) *affinis*
- Sepals glabrous on the inner surface . . . . (126) *reversa*
- Flowers not exceeding 6 mm. in length :
- Ovary villous :
- Flowers uniformly covered with hair on the outer surface :
- Leaves ascending or erect-spreading, attenuate ; capitula about 1 cm. wide, distinctly overtopped by the accompanying leaves . . . . . (8) *Bathiei*
- Leaves erect-spreading, spreading or somewhat declinate, not attenuate ; capitula 1.2—1.5 cm. wide, not overtopped by accompanying leaves . . . . . (7) *emirnenensis*, var. *nyasae*
- Flowers with less hair on the tube than on other parts of the outer surface :
- Flowers about 5 mm. long ; petals inserted on the upper half of the tube . . . . . (9) *tropica*
- Flowers about 3.5 mm. long ; petals inserted at the mouth of the tube . . . . . (7) *emirnenensis*
- Ovary glabrous :
- Flowers 2.75—3.5 mm. long ; calyx-tube tomentose on the upper half outside . . . . . (92) *Tysoni*, var. *brevifolia*
- Flowers 3.5—4 mm. long ; calyx-tube glabrous . . . . . (76) *chionocephala*
- ‡‡Petals setaceous, acicular, linear or lanceolate, or consisting of a claw and a lanceolate, ovate-lanceolate, ovate or elliptic lamina :
- Leaf-lamina widely or rather deeply cordate at base :
- Leaves mostly 1.5—2 cm. long, with more than half of the lower surface of the lamina exposed . . . . . (127) *spicata*
- Leaves less than 1 cm. long, with most of the lower surface of the lamina hidden by the margins :
- Petals setaceous, without cilia . . . . . (118) *debilis*
- Petals consisting of a short claw and ovate, widely ovate or elliptic, ciliate lamina :
- Leaves 5—7.5 mm. long ; involucre conspicuously persisting several years . . . . . (101) *laevis*
- Leaves 1.75—5 mm. long ; persisting involucre inconspicuous :
- Leaves 1.75—2.5 mm. long, the lamina ovate-lanceolate, strongly incurved . . . . . (100) *brevifolia*
- Leaves 3.5—5 mm. long, the lamina lanceolate-linear, slightly incurved . . . . . (102) *lasiantha*
- Leaf-lamina rounded, subcordate or cordate at base :
- §Petals lanceolate or with a claw and an ovate, lanceolate, elliptic, oblong- or oblanceolate-elliptic lamina :
- Capitula usually 3.5—4 cm. wide ; calyx-tube pubescent on the inner surface . . . . . (124) *pubescens*
- Capitula not exceeding 2.5 cm. in diameter ; calyx-tube glabrous on the inner surface :
- Bracteoles absent :
- Leaf-lamina smooth or at most slightly pitted on the upper surface :

- Flowers 4 mm. long .. .. . (133) *intrusa*  
 Flowers 6.5—7 mm. long .. .. . (117) *curvifolia*  
 Leaf-lamina tubercled on the upper surface:  
 Tubercles crowded and often joined;  
 flowers 5—7 mm. long .. .. . (123) *insignis*  
 Tubercles scattered, separated by distinct bare spaces; flowers 1.5—2 mm. long .. .. . (29) *Schlechteri*  
 Bracteoles present:  
 Sepals 3—4.5 mm. long .. .. . (125) *Dodii*  
 Sepals less than 3 mm. long:  
 Flowers about 5 mm. long; ovary pubescent .. .. . (9) *tropica*  
 Flowers not exceeding 4 mm. in length; ovary glabrous:  
 Calyx-tube 0.5 mm. deep .. .. . (93) *glabrata*  
 Calyx-tube 1.5 mm. deep .. .. . (73) *nigrita*  
 §§Petals setaceous, acicular, linear or oblanceolate-linear:  
 Bracteoles absent:  
 Sepals bearded on the inner surface .. (145) *altigena*  
 Sepals not bearded on the inner surface:  
 Sepals 1.5 mm. long, deltoid, attenuate (133) *intrusa*  
 Sepals 3 mm. long, oblong-lanceolate, attenuate .. .. . (91) *Simii*  
 Bracteoles 2-4:  
 Sepals with pubescence on a portion of the inner surface:  
 Leaf-lamina tuberculate only up the sides and middle of the upper surface (129) *pustulata*  
 Leaf-lamina minutely tuberculate over the entire upper surface:  
 Branchlets clothed with spreading villi and short tomentum; leaf-lamina lanceolate or linear-lanceolate, conspicuously villous on the upper surface with spreading hairs; ovary more or less tomentose .. (113) *hirta*  
 Branchlets sparsely clothed with short adpressed hairs; leaf-lamina acicular or narrowly linear, inconspicuously pubescent on the upper surface with adpressed hairs; ovary glabrous .. .. . (128) *agathosmoides*  
 Sepals glabrous on the inner surface:  
 Capitula inconspicuous, 3—5 mm. wide (84) *stenopetala*  
 Capitula conspicuous, 5—10 mm. wide:  
 Leaf-lamina minutely and closely tubercled or almost smooth on the upper surface .. .. . (132) *odorata*  
 Leaf-lamina coarsely tubercled on the upper surface; tubercles distinctly spaced, prominent in profile:  
 Flowers 2.5—3 mm. long; sepals lanceolate-deltoid .. (115) *piquetbergensis*  
 Flowers 5—7 mm. long; sepals linear (131) *Barnardii*  
 Bracteoles 5—12:  
 Sepals pubescent on a portion of the inner surface:  
 Branchlets sparsely piloso with spreading hairs; leaf-lamina villous on the sides and middle of the upper surface (130) *cylindrica*



- Branchlets clothed with short, adpressed hairs; leaf-lamina with short, adpressed hairs over the entire upper surface . . . . . (128) *agathosmoides*
- Sepals glabrous on the inner surface or, in *montana*, minutely puberulous on the convex portion :
- Branchlets cano-puberulous; leaf-lamina closely tuberculate on the upper surface; capitula about 0·8 cm. wide; bracts 3—4 mm. long; flowers 3·5—4 mm. long . . . . . (112) *montana*
- Branchlets grey-villous; leaf-lamina almost smooth on the upper surface; capitula about 1·2 cm. wide; bracts about 6 mm. long; flowers about 5 mm. long . . . . . (114) *Pearsonii*
- ††Petals with the lamina more or less cucullate, deeply concave, galeate, calyptriform or shaped at the apex like the bow of a canoe :
- ‖Petals with a galeate or calyptriform lamina, the front edge, in side view, being on a level with the upper end of the claw or lower :
- Capitula 1·5—2 cm. wide; flowers 8 mm. long or longer :
- Bracts showy, conspicuously overtopping the flowers (104) *calcarata*
- Bracts comparatively inconspicuous, not overtopping the flowers :
- Calyx-tube obovate; sepals lanceolate, acuminate . . . . . (90) *propinqua*
- Calyx-tube narrowly urceolate or subcylindric; sepals narrowly linear . . . . . (107) *laevifolia*
- Capitula mostly less than 1 cm. wide or rarely very slightly exceeding 1 cm.; flowers not exceeding 5 mm. in length :
- Ovary clothed with hairs :
- Leaf-lamina coarsely tubercled; hairs on the ovary soft, persistent . . . . . (99) *comosa*
- Leaf-lamina smooth or more or less rough with fine tubercles; hairs on the ovary coarse, caducous . . . . . (73) *nigrita*
- Ovary glabrous :
- Sepals linear- or ovate-lanceolate :
- Leaf-lamina distinctly cordate and distinctly widest at base :
- Leaves 10—14 mm. long, long-acuminate; petioles about 2 mm. long, much compressed . . . . . (96) *nodosa*
- Leaves 6—10 mm. long, acute, not long-acuminate; petioles about 1 mm. long, not much compressed :
- Leaves at the base of the capitulum mostly with ample ciliation, the lamina linear-lanceolate or lanceolate, the long hairs on the revolute portions of the margins tardily deciduous . . . . . (95) *gracilis*
- Leaves at the base of the capitulum mostly with sparse ciliation or without ciliation, the lamina lanceolate or ovate-lanceolate, the long hairs on the revolute portions of the margins not remaining for long . . . . . (94) *atrata*

- Leaf-lamina rounded or subcordate at base,  
not or but indistinctly widest at base :  
Capitula mostly containing up to 7 flowers (120) *virgata*  
Capitula mostly containing more than 14  
flowers :  
Leaves taper-pointed ; capitula sub-  
tended by many leaves ; petals with  
the lamina rotundate or orbicular as  
seen from above . . . . . (89) *vulgaris*  
Leaves abruptly acute ; capitula sub-  
tended by several leaves ; petals  
with a laterally compressed lamina (73) *nigrita*
- Sepals ovate or deltoid-ovate :  
Leaf-lamina ovate-lanceolate or lanceolate,  
distinctly cordate and widened at base :  
Branchlets filiform ; leaves 1.75—2.5 mm.  
long ; capitula 3—4 mm. wide . . . (81) *anomala*  
Branchlets slender ; leaves about 5 mm.  
long ; capitula 5—7 mm. wide . . . (68) *floribunda*
- Leaf-lamina linear or lanceolate-linear,  
rounded or somewhat cordate at base,  
not distinctly widened at base :  
Capitula subtended by several conspicuous  
leaves in length about twice the height  
of the capitula . . . . . (72) *linifolia*  
Capitula subtended by inconspicuous and  
proportionately much shorter leaves :  
Leaves crowded ; capitula rounded above,  
not exceeded by subtending leaves,  
mostly containing at least 15 flowers (66) *ericoides*  
Leaves not crowded ; capitula somewhat  
flattened above, shortly exceeded by  
several subtending leaves, mostly  
containing less than 15 flowers . . . (82) *disticha*
- |||Petals with the lamina more or less cucullate, deeply  
concave or, at the apex, shaped like the bow of a  
canoe, usually ovate, elliptic, rotundate, orbicular  
or cordate :
- ¶Flowers pedicellate ; pedicels mostly 1 mm. long  
or longer :  
Bract or subtending leaf twice as long as the  
flower together with the pedicel . . . . . (26) *ambigua*  
Bract or subtending leaf less than twice as long  
as the flower together with the pedicel :  
Calyx-tube 0.75—3.5 mm. deep, cyathiform or  
narrowly campanulate ; style 1.5—5 mm.  
long :  
Inflorescence somewhat depressed, involucred  
with leaves ; leaves 1.3—1.8 cm. long,  
the lamina ovate, with the lower surface  
almost entirely exposed . . . . . (49) *dioica*  
Inflorescence racemose not involucred ; leaves  
0.5—1.6 cm. long, the lamina acicular  
to linear-lanceolate, with the lower sur-  
face entirely hidden or almost so : . . .  
Inflorescence 2—4 cm. long ; calyx-tube  
3—3.5 mm. deep . . . . . (50) *Mundii*  
Inflorescence 0.5—1 cm. long ; calyx-tube  
0.75—2.5 mm. deep . . . . . (47) *Willdenowiana*
- Calyx-tube at most 1 mm. deep, broadly cyathi-  
form ; style not exceeding 1 mm. in length ;  
Leaf-lamina open-backed, rounded at base,  
with the midrib, on the lower surface,

- glabrous or very minutely puberulous, and the secondary veins usually visible; fruit with 10 longitudinal ridges . . . . . (3) *oleaeifolia*
- Leaf-lamina with the lower surface for the most part hidden by the revolute margins [In shaded forms of *axillaris* the lamina is more or less open-backed but the midrib is tomentose or villous and secondary veins not visible.], rounded or cordate at base, with the midrib tomentose or villous and the secondary veins not visible; fruit not or but indistinctly ridged longitudinally:
- Petals with a cuneate-oblong or oblong claw as long as or longer than the lamina:
- Flowers with a distinct constriction between the tube and the ovary . . . . . (19) *pinex*
- Flowers without a constriction between the tube and the ovary:
- Flowers in lax racemes . . . . . (18) *axillaris*
- Flowers in capitula . . . . . (20) *purpurea*
- Petals with a claw about half as long as the lamina or shorter (rarely almost as long in varieties of *axillaris*):
- Leaf-lamina with the upper surface smooth or with a few minute pustules about the apex, with pubescence on the revolute portion of the margins and about the apex in the young state:
- Leaf-lamina with the greater part of the lower surface exposed; flowers in the axils of leaves of average size and widely spaced well below the developing terminal growth; calyx with tomentum and straight silky hairs on the outer surface . . . . . (18) *axillaris*, var. *gracilis*
- Leaf-lamina with the greater part of the lower surface hidden by the revolute margins; flowers in the axils of leaves much smaller than the average and crowded in compact racemes terminating the branchlets; calyx clothed with tomentum only on the outer surface . . . . . (18) *axillaris*, var. *Cooperi*
- Leaf-lamina with the entire, or almost the entire, upper surface distinctly or minutely scabrid, with pubescence on the scabrid part in the young state:
- Racemes almost always associated in crowded paniculate or subcorymbose clusters; ultimate branchlets very short and leafless; bracts distinct from the leaves, not much longer than the pedicels:
- Racemes 0.2—0.4 cm. long (rarely longer except when elongating with the fall of the lower flowers), capituliform, usually several or

- many in a subcorymbose cluster ;  
 tomentum on the flowers drying  
 white . . . . . (24) *cryptandroides*
- Racemes mostly 1—1.5 cm. long,  
 rather lax, usually ovate or ro-  
 tundate, mostly solitary or not  
 more than a few together, if  
 clustered, and the central one  
 much over-topping those below ;  
 tomentum on the flowers drying  
 cream . . . . . (25) *rigidifolia*
- Racemes solitary or, if associated in  
 lax or crowded panicles, the ulti-  
 mate branchlets leafy :
- Calyx covered outside with retrorse  
 hairs . . . . . (23) *elimensis*
- Calyx not covered outside with re-  
 trorse hairs :
- Style cylindric . . . . . (12) *natalensis*
- Style conical or wider :
- Leaves acerose, secund, directed  
 upwards on the spreading  
 branches . . . . . (27) *villosa*
- Leaves linear or lanceolate, not  
 secund . . . . . (18) *axillaris*, var.  
*microphylla*
- ¶¶ Flowers stipitate or sessile :
- Bracts (floral), at least the outer, conspicuous,  
 twice as long as the flowers :
- Sepals amply bearded on the lower half of the  
 inner surface . . . . . (138) *Bolusti*
- Sepals not bearded on the inner surface :
- Flowers 2.5—3 mm. long . . . . . (28) *recurvifolia*
- Flowers 4.5—8 mm. long :
- Calyx-tube with retrorse hairs on the outer  
 surface . . . . . (64) *plumosa*
- Calyx-tube without retrorse hairs on the  
 outer surface :
- Inflorescence spicate ; petals with a cor-  
 date lamina . . . . . (63) *velutina*
- Inflorescence capituliform ; petals with-  
 out a cordate lamina :
- Leaf-lamina lanceolate . . . . . (104) *lucida*
- Leaf-lamina linear or linear-subulate  
 . . . . . (121) *Meyeri*
- Bracts (floral) less than twice as long as the flowers :
- Calyx-tube clothed outside with retrorse hairs :
- Sepals with hairs on the outer surface of  
 about the same length and texture as  
 those upon the tube . . . . . (59) *strigulosa*
- Sepals with hairs upon the outer surface dis-  
 tinctly longer and coarser than those  
 upon the tube :
- Anthers oblong or linear-oblong as viewed  
 from the back ; cells obtuse at the apex,  
 with the posterior margins parallel,  
 except where they merge towards the  
 apex ; calyx-tube terete ; stigma not  
 reaching up to the base of the anthers  
 . . . . . (60) *strigosa*
- Anthers cordate as viewed from the back ;  
 cells somewhat obliquely truncate at  
 the apex, with the posterior margins  
 diverging from the apex to the base ;  
 calyx-tube more or less pentangular ;

- stigma reaching up to about the middle or at least the base of the anthers :
- Petals complicate-cucullate, with an acute, slightly recurved or erect apex ; bracts readily distinguishable from the flowers while in the inflorescence, with the longer hairs rather coarse, fulvous or golden . . . . . (62) *excelsa*
- Petals with the upper margins united to form a hood with an acute, incurved or erect apex ; bracts scarcely distinguishable from the flowers while in the inflorescence, with the longer hairs usually silky and white . . . . . (58) *imberbis*
- Calyx-tube without retrorse hairs on the outside :
- Petals with a ciliate or fimbriate lamina :
- Flowers 5.5—6 mm. long . . . . . (110) *Harveyi*
- Flowers 2.5—5 mm. long :
- Leaf-lamina linear-oblong, rounded or indistinctly cordate at base . . . . . (116) *stenantha*
- Leaf-lamina lanceolate or ovate-lanceolate, conspicuously cordate at the much widened base :
- Leaf-lamina pustulate on the margins . . . . . (108) *cuspidata*
- Leaf-lamina smooth or impressed-punctate on the margins . . . . . (109) *Thunbergiana*
- Petals without cilia or fimbriae, but tipped with a single hair in one species :
- Calyx-tube 2.5—8 mm. deep, oblong-tubular, tubular-infundibuliform or tubular-obconic or urceolate :
- Calyx-tube glabrous ; sepals lanceolate-linear, as long as the tube . . . . . (106) *amoena*
- Calyx-tube tomentose or hirsute outside ; sepals ovate, lanceolate-ovate, oblong- or ovate-lanceolate, distinctly shorter than the tube :
- Calyx-tube sparsely clothed with long, caducous, coarse hairs . . . . . (139) *tortuosa*
- Calyx-tube amply clothed with persistent, short, silky pubescence or short tomentum :
- Leaves with the lamina distinctly cordate at base ; flowers 4—4.5 mm. long . . . . . (55) *tubulosa*
- Leaves with the lamina rounded at base ; flowers from about 5 mm. long upwards :
- Flowers about 5 mm. long ; calyx-tube urceolate, costate on the outer surface . . . . . (48) *costata*
- Flowers from 6 mm. long upwards ; calyx-tube tubular or cylindrical, ecostate :
- Style 2.5 mm. long . . . . . (51) *gnidioides*
- Style 3.5—9 mm. long :
- Ovary clothed with rather long, silky hairs . . . . . (52) *abietina*
- Ovary clothed with short tomentum or short, velvety pubescence :

- Flowers 0.9—1.3 cm. long ;  
 petals 1.5—1.75 mm.  
 long, the lamina ellip-  
 tic-ovate ; style 7—9  
 mm. long . . . . . (54) *Fourcadei*
- Flowers 0.6—0.8 cm. long ;  
 petals 0.75—1 mm.  
 long, the lamina cor-  
 date ; style 4.5—5.5  
 mm. long . . . . . (53) *lachnaeoides*
- Calyx-tube not exceeding 2 mm. in depth,  
 obconic, cyathiform, broadly cyathi-  
 form or broadly campanulate ;
- Calyx-tube with a conspicuous fleshy disc  
 with a free outer margin :
- Ovary glabrous :
- Capitula much overtopped and, in-  
 side view, hidden by the sur-  
 rounding leaves ; flowers 1.75—  
 2 mm. long ; sepals 0.5 mm.  
 long . . . . . (45) *minutiflora*
- Capitula not or very shortly over-  
 topped but not hidden, except  
 at base, by surrounding leaves ;  
 flowers 2.5—3 mm. long ; sepals  
 1—1.5 mm. long . . . . . (22) *variabilis*
- Ovary pubescent :
- Flowers in short spikes assembled in  
 panicles, or in peduncled or sub-  
 sessile clusters in the axils of  
 the upper leaves, or crowded in  
 a thyrsiform inflorescence :
- Leaves at first with short tomen-  
 tum upon the upper surface ;  
 sepals 1—1.5 mm. long, with  
 dorsal hair at least half as  
 long . . . . . (5) *arborea*
- Leaves at first pilose upon the  
 upper surface ; sepals 0.75—  
 1 mm. long, with dorsal hair  
 much less than half as long ;
- Petals with the claw one third  
 as long as the lamina . . . . . (4) *polifolia*
- Petals with the claw as long as  
 the lamina . . . . . (1) *paniculata*
- Flowers in capitula subtended by  
 several leaves :
- Leaf-lamina open-backed, with  
 evident secondary nerves on  
 the lower surface . . . . . (15) *burifolia*
- Leaf-lamina ericoid, without evi-  
 dent secondary nerves on the  
 lower surface :
- Leaf-lamina obtuse at apex . . . . . (42) *cephalantha*
- Leaf-lamina acute at apex : . . . . . (40) *rubra*
- Flowers 1.25—1.5 mm. long
- Flowers at least 2 mm. long :
- Leaf-lamina smooth and  
 shiny on the upper sur-  
 face, obscurely pustule-  
 late on the margins . . . . . (2) *wittebergensis*
- Leaf-lamina wrinkled, finely  
 scabrate or tuberculate.

- scabrid on the upper surface :
- Leaf-lamina cordate at base .. .. . (21) *confusa*
- Leaf-lamina rounded or narrowed at base .. (6) *mauritiana*
- Calyx-tube without a fleshy disc having a free outer margin ; the disc, when present, usually inconspicuous, and if somewhat conspicuous is without a free outer margin :
- × Ovary bearing hairs (in some species the hairs are deciduous) :
- Leaf-lamina with the lower surface for the most part exposed :
- Leaf-lamina with conspicuous secondary nerves on the lower surface ; calyx-tube 0.75 mm. deep .. .. . (16) *fruticosa*
- Leaf-lamina without conspicuous secondary nerves on the lower surface ; calyx-tube 1.5 mm. deep .. .. . (57) *ampliata*
- Leaf-lamina with the lower surface hidden, slightly or half-exposed :
- Anthers 0.5—1 mm. long, oblong, elliptic or cordate (viewed from the adaxial side), 2-celled :
- Anther-cells obliquely truncate at apex ; bracteoles present (58) *imberbis*
- Anther-cells rounded or sub-acute at apex ; bracteoles absent :
- Ovary covered with short, persistent hairs ; style 1—1.5 mm. long .. (61) *Stokoei*
- Ovary covered with long deciduous hairs ; style about 2.5 mm. long .. (65) *nigromontana*
- Anthers less than 0.5 mm. long, reniform, orbicular or rotundate-cordate, 1-celled :
- Calyx-tube with a covering of deciduous, often caducous hairs on the outer surface or glabrous :
- Flowers 1.75—2.5 mm. long ; Leaves 2—2.5 mm. long, dorsally compressed .. (75) *incurvata*
- Leaves 3—6 mm. long, semi-terete .. .. . (67) *floccosa*
- Flowers 2—7 mm. long ; capitula more than 8-flowered :
- Calyx-tube 0.75—1.75 mm. deep ; stigma sessile .. (70) *selaginoides*
- Calyx-tube 1—2 mm. deep ; stigma on a style scarcely 0.5—1.75 mm. long :
- Sepals 0.75—1.25 mm. long, ovate, acute,

- with a prominent midrib; petals inserted at the mouth of the tube. . . . (56) *diosmoides*
- Sepals 1.5—2 mm. long, lanceolate or ovate-lanceolate, convex on the inner surface; petals inserted half-way up the tube:
- Leaf-lamina with closely set tubercles; capitula 1—1.5 cm. wide; calyx-tube 1.75—2 mm. deep; styles 0.75—1 mm. long. . . (123) *insignis*
- Leaf-lamina with well-spaced tubercles; capitula 0.6—0.8 cm. wide; calyx-tube 1.25—1.5 mm. deep; style together with the stigma scarcely 0.5 mm. long. . . (122) *Salteri*
- Calyx-tube with an ample or sparse covering outside of persistent hairs:
- Sepals more or less attenuate from an ovate base, or ovate in the lower half and attenuate upwards:
- Sepals sparsely and shortly bearded on the inner surface. . . . (119) *Keetii*
- Sepals not bearded on the inner surface:
- Sepals covered outside with long, woolly hair; ovary covered with long, silky hair. . . (13) *Thodei*
- Sepals and ovary covered outside with short tomentum. . . . (14) *Galpinii*
- Sepals ovate or deltoid-ovate, more or less acute:
- Sepals sparsely bearded on the inner surface. . . (35) *longimontana*
- Sepals glabrous on the inner surface:
- Leaf-lamina tubercled or tuberculate-scabrid over the whole of the upper surface:
- Flowers 3.5—5 mm. long. . . (32) *chionophila*
- Flowers 2.5—2.75 mm. long:
- Style about 0.5 mm. long, columnar; leaves 10—14 mm. long; tubercles on the lamina clearly spaced. . . . (34) *tuberculata*



- Style shorter, broadly conical; leaves 4—6 mm. long; tubercles on the lamina very crowded, minute (30) *lanata*
- Leaf-lamina smooth or minutely punctate over the whole of the upper surface, or pustulate upon the margins and sometimes also up the middle:  
Leaves 1.75—2.5 mm. long . . . . (37) *humilis*  
Leaves at least 3 mm. long:  
Leaf-lamina distinctly cordate at base:  
Flowers 2 mm. long; sepals almost glabrous . . . . (43) *Greyii*  
Flowers 3—3.5 mm. long; sepals with a dense covering of hair on the outer surface . . . . (41) *laevigata*
- Leaf-lamina rounded or subcordate at base:  
Leaves mostly 6—12 mm. long; capitula 5—6 mm. wide; fruit tomentose . . . . (33) *lasiocarpa*  
Leaves 5—6 mm. long; capitula 2—3 mm. wide; fruit glabrous . . . . (36) *brachycephala*
- × × Ovary glabrous or with a few strayed hairs from the tube or stipe, sometimes more or less screened by hairs arising upon the stipe:  
Sepals ovate or deltoid-ovate, in length not more than twice the greatest width:  
Leaf-lamina deeply cordate at base; petiole hidden by the base of the lamina:  
Leaves 1.5—2 mm. long; lamina with dorsally compressed false margins . . . . (78) *parvula*  
Leaves 3—5 mm. long; lamina subulate . . . . (87) *subulifolia*  
Leaf-lamina cordate, subcordate or rounded at base; petiole not hidden by the lamina:

- Leaf-lamina with the whole of the upper surface uniformly tubercled and at first pubescent :
- Leaf-lamina lanceolate or ovate-lanceolate, distinctly cordate at base . . . . . (79) *acmaephylla*
- Leaf-lamina linear, rounded or subcordate at base :
- Leaves 4—6 mm. long, obtuse : capitula about 4 mm. wide . . . . . (74) *pauciflora*
- Leaves 8—10 mm. long, acute ; capitula about 6 mm. wide . . . . . (46) *lucens*
- Leaf-lamina with the whole or a great part of the upper surface smooth, wrinkled or minutely scabrid, or more or less tubercled on the margins :
- Leaf-lamina ovate or lanceolate-ovate ; the lower surface half or more than half-exposed . . . . . (80) *diffusa*
- Leaf-lamina linear, lanceolate-linear, linear-lanceolate, oblong or oblong-lanceolate ; the lower surface hidden or at most half-exposed in the lower half :
- Petals having a claw about half as long as the lamina :
- Upper surface of the leaf-lamina conspicuously tubercled on the margins . . . . . (44) *Rogersii*
- Upper surface of the leaf-lamina smooth, minutely scabrid or obscurely tubercled on the margins :
- Leaf-lamina semi-terete . . . . . (71) *karroica*
- Leaf-lamina dorsally compressed . . . . . (80) *diffusa*, var. *Burchellii*
- Petals having a claw about as long as the lamina :
- Flowers 1.5—2 mm. long :
- Leaves mostly 4—5 mm. long . . . . . (77) *parviflora*
- Leaves mostly 5—8 mm. long . . . . . (66) *ericoides*
- Flowers 2.5—3.5 mm. long :
- Leaves 0.7—1.4 cm. long ; upper surface smooth and persistently pilose up the middle . . . . . (10) *apiculata*
- Leaves 1—2.5 cm. long ; upper sur-

- face minutely  
tubercled and soon  
becoming glabrous  
up the middle . . . (11) *Guthriei*
- Sepals ovate-lanceolate or lanceolate,  
in length at least twice the  
greatest width:
- Leaf-lamina ovate or deltoid, the  
lower surface almost entirely  
exposed:
- Leaf-lamina deltoid, callose on  
the margins . . . . (88) *callosa*
- Leaf-lamina ovate, smooth,  
slightly wrinkled or minute-  
ly tuberculate-scabrid over  
the entire upper surface . . (17) *nervosa*
- Leaf-lamina linear, lanceolate-  
linear, lanceolate or ovate-  
lanceolate, the lower surface  
hidden or half-exposed:
- Leaf-lamina cordate at base:
- Leaves 4—6 mm. long; flowers  
2—2.5 mm. long:
- Leaf-lamina tubercled over  
the entire upper sur-  
face . . . . (86) *alpina*
- Leaf-lamina tubercled only  
on the margins . . . . (83) *Mairei*
- Leaves 5—15 mm. long;  
flowers 2.5—4 mm. long:
- Leaf-lamina clothed with  
sub-adpressed hairs . . (69) *sericea*
- Leaf-lamina at first with  
spreading hairs various-  
ly distributed:
- Leaf-lamina tubercled on  
the margins, median  
nerve and about the  
apex, or tubercled  
over the entire upper  
surface . . . . (88) *callosa*
- Leaf-lamina wrinkled or  
smooth on the upper  
surface:
- Leaves 5—7 mm. long;  
lamina minutely  
scabrid on the  
upper surface, ob-  
scurely and sparse-  
ly tubercled on  
the margins . . (85) *alba*
- Leaves 7—15 mm. long;  
lamina smooth on  
the upper surface,  
without tubercles  
on the margins . . (98) *litoralis*
- Leaf-lamina rounded at base:
- Stigma sessile or subsessile;  
calyx-tube glabrous on  
the outer surface . . (73) *nigrita*
- Stigma on a columnar style;  
calyx-tube more or less

- villous on the upper half  
of the outer surface :
- Capitula hemisphaeric;  
flowers 2.75—3.5 mm.  
long; sepals about 1.5  
mm. long; petals about  
0.5 mm. long . . . . . (92) *Tysoni*
- Capitula widely conical;  
flowers 5 mm. long;  
sepals 2—2.5 mm. long;  
petals about 1 mm.  
long . . . . . (97) *Burchellii*
- \*\*Petals absent :
- †Sepals glabrous, sparsely pubescent or puberulous on the  
inner surface :
- Capitula 2.5—3 cm. wide; bracts very conspicuous . . (124) *pubescens*, var.  
*orientalis*
- Capitula less than 2 cm. wide; bracts not very con-  
spicuous :
- Calyx-tube with retrorse hairs on the outer surface (38) *Comptonii*
- Calyx-tube without retrorse hairs :
- Sepals sparsely pubescent on the lower half of the  
inner surface . . . . . (103) *constricta*
- Sepals glabrous on the inner surface or minutely  
puberulous on the median angle :
- Leaves not exceeding 5 mm. in length :
- Ovary persistently villous . . . . . (31) *obtusifolia*
- Ovary not persistently villous :
- Ovary sparsely villous on the upper half  
or at the middle or glabrous . . . . . (84) *stenopetala*,  
var. *Sieberi*
- Ovary entirely clothed with long silky  
hairs :
- Leaf-lamina straight or rarely somewhat  
curved downwards . . . . . (39) *retrorsa*
- Leaf-lamina more or less curved upwards (118) *debilis*, var.  
*Fourcadei*
- Leaves at least 5 mm. in length :
- Bracteoles absent . . . . . (133) *intrusa*
- Bracteoles present :
- Leaf-lamina with fairly evenly spaced pro-  
minent tubercles over the entire upper  
surface . . . . . (131) *Barnardii*
- Leaf-lamina minutely and closely tubercled  
over the entire upper surface or smooth  
and the tubercles confined to the  
margins :
- Leaf-lamina smooth except for tubercles  
confined to the margins . . . . . (135) *alticola*
- Leaf-lamina minutely and closely  
tubercled over the entire upper  
surface :
- Flowers 5—6.5 mm. long; sepals  
linear, deltoid-ovate at base;  
stigma subsessile . . . . . (132) *odorata*
- Flowers 3.5—5 mm. long; sepals  
ovate, acuminate; stigma on a  
distinct style . . . . . (112) *montana*
- ††Sepals bearded on the inner surface :
- Sepals less than half as long as the tube :
- Sepals about 1 mm. long, deltoid, acute . . . . . (147) *aemula*
- Sepals 1.25—2 mm. long, deltoid, acuminate :

- Calyx-tube 3—4.5 mm. deep, urceolate; style  
0.75—1.5 mm. long . . . . . (143) *Marlothii*
- Calyx-tube 5—5.5 mm. deep, tubular-obconic;  
style 2 mm. long . . . . . (146) *plumigera*
- Sepals at least half as long as the tube:
- Leaves 0.4—1 cm. long; capitula 1—1.5 cm. wide:
- Calyx-tube pubescent on the inner surface . . (136) *retorta*
- Calyx-tube glabrous on the inner surface:
- Capitula about 1.5 cm. wide; involucrel leaves  
ciliate with coarse hairs; calyx-tube 2 mm.  
deep, shortly tomentose on the outer surface (141) *pulchella*
- Capitula about 1 cm. wide; involucrel leaves  
ciliate with silky hairs; calyx-tube 3 mm.  
deep, silky villous on the outer surface . . (134) *Levynsiae*
- Leaves 1—2.5 cm. long; capitula 1.5—2.5 cm.  
wide:
- Ovary sparsely furnished with long, coarse hairs (149) *barbata*
- Ovary amply furnished with short or long hairs or  
with both:
- Calyx-tube not exceeding 2 mm. in depth . . (142) *rigida*
- Calyx-tube exceeding 2 mm. in depth:
- Sepals about as long as the tube . . . . (144) *Leipoldtii*
- Sepals about half as long as the tube . . (143) *Marlothii*

1. ***P. paniculata***, Willd., *Sp. Pl.* i, 1112 (1798); *Poir. in Lam. Encycl. Bot.* v, 294 (1804); *Thunb., Diss. Phyllica* 9 (1804); *Pers., Syn. Pl.* i, 245 (1805); *Willd., Enum. Hort. Berol.* 253 (1809); *Du Mont de Cours., Bot. Cult.* ed. 2, vi, 274 (1811); *Roem. et Schultes, Syst. Veg.* v, 486 (1819); *Link, Enum. Hort. Berol.* i, 230 (1821); *Thunb., Fl. Cap.* ed. 2, p. 203 (1823); *Linn., Syst. Veg.* ed. 16, vol. i, p. 829 (1825); *DC., Prodr.* ii, 36 (1825); *Sond. in Harv. et Sond. Fl. Cap.* i, 482 (1860) incl. var.; *Sim, Forest Flora of Cape Colony* 180, tab. 36, fig. 4 (1907): ***P. oblongifolia***, *Du Mont de Cours., Bot. Cult.* ed. 1, p. 613 (1802): ***P. thymifolia***, *Vent., Jard. Malm.* i, tab. 57 (1803); *Poir. in Lam. Encycl. Suppl.* iv, 400 (1816); *Roem. et Schultes, Syst. Veg.* v, 490; *Linn., Syst. Veg.* ed. 16, vol. i, p. 828; *DC., Prodr.* ii, 37: ***P. myrtifolia***, *Poir. in Lam. Encycl.* v, 293 (1804) !; *Pers., Syn. Pl.* i, 245; *Lam., Encycl. Suppl.* iv, 400 (1816): ***P. ledifolia***, *Desf.* [Tabl. ed. 1, p. 203 (1804) nomen; *Du Mont de Cours., Bot. Cult.* ed. 2, vi, 275 (1811) nomen] *ex DC. Prodr.* ii, 37 (1825); *Don, Gen. Syst.* ii, 42 (1832): ***P. angustifolia***, *Hort. ex Steud. Nomen.* ed. i, p. 614 (1821) absque descr.; ed. 2, pars. 2, p. 325 (1841): ***Soulangia paniculata***, *Brongn., Mem. Rham.* 71 (1826); *in Ann. Sc. Nat.* x, 378 (1827); *Don, Gen. Syst.* ii, 42; *A. Dietr. in Otto et Allg. Gartenz.* vii, 386 (1839): ***S. arborescens***, *Ecklon et Zeyher, Enum.* 136 (1835) !: ***S. rosmarinifolia***, *Harv., Gen. S. Afr. Pl.* 62 (1838): ***S. myrtifolia***, *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 381: ***S. rubra***, *A. Dietr. l.c.*: ***S. epacridifolia***, *A. Dietr. op cit.* p. 387: ***P. sessiliflora***, *Hort. ex Steud. Nom.* ed. 2, pars. 3, p. 326 (1841) absque descr.: ***P. arborescens***, *Steud. op cit.* p. 325, absque descr.: ***S. marifolia***,

*Bernh. ex Krauss in Flora* xxvii, 348 (1844); *Krauss, Beiträge zur Flora des Cap. und Natal* 45 (1846): **S. parviflora**, *Presl., Bot. Bemerk.* 38 (1844).

A much branched shrub of about 2 m. in height, or a tree up to 6 m. high with a stem up to 25 cm. thick. Branchlets slender, clothed with short, grey tomentum. Leaves crowded or widely spaced, mostly 1—1.5 cm. long, up to 3 cm. long: lamina erect-spreading, varying from linear to lanceolate, ovate, elliptic or oblong-elliptic, acute, rounded or subcordate at base, with revolute margins covering the lower surface in varying degree from the edges to the midrib but usually covering less than half of the lower surface; upper surface more or less convex, minutely scabrid or closely and minutely tubercled over the whole area, at first lightly covered with short, grey tomentum, often with impressed midrib and secondary nerves: petiole 1.75—2 mm. long. Flowers 1.5—2.5 mm. long, shortly stipitate, covered with short, grey tomentum on the outer surface, glabrous on the inner, in short spikes assembled in panicles, or in pedunculate or sessile, capituliform spikes arising in the axils of the upper leaves and assembled in panicles or solitary at the ends of the branchlets. Bracts foliaceous, or the upper much reduced and differing from the leaves. Bracteoles 2, occasionally present, minute, linear-lanceolate. Calyx-tube broadly cyathiform, filled with a fleshy disc having a free outer margin. Sepals 0.75—1 mm. long, ovate, acute, flattened, with a raised midrib on the inner surface, gibbous at the apex. Petals inserted at the mouth of the tube, about 0.5 mm. long: lamina cucullate, orbicular: claw as long, cuneate. Anthers 1-celled. Ovary obconic. Style short, conical, with 3 small, erect stigmatic lobes. Fruit 6—7 mm. long, obovate-rotundate, glabrous when mature, dark chestnut-brown, with a large or small depressed area on the summit.

**South Africa:** without precise locality, *Masson, Lichtenstein* in Berlin Herb. 120, *Roxburgh, Drège* in *Bot. Mus., Stockholm*.

**CAPE PROVINCE:** WORCESTER DIV.: Hex River, *Rehmann in Bolus Herb.* 5614.—LAINGSBURG DIV.: Witteberg, *Rehmann* 2944, *Marloth* 2960, *F. and L. Bolus in Bolus Herb.* 13871, *Compton* 2589, 2978, 2985, 5879; Klein Zwartberg, *Muir* 4594.—MONTAGU DIV.: Montagu Baths, *Page in Bolus Herb.* 19095; mountains near Montagu, *Levyns* 132.—PRINCE ALBERT DIV.: Great Zwartberg near Vrolyk, *Drège* 2349; Zwartberg Pass, *Pearson in Bolus Herb.* 15592, *Deas* 15, *Marloth* 12117, *Pocock* S176, *Dyer* 93, *Compton* 10416; LADISMITH DIV.: Ladismith, *Morloth* 2931; Seven Weeks Poort, *Phillips* 1419, *Levyns* 2426, *Compton* 4026, 4238, 8615, 8616.—RIVERSDALE DIV.: Aasvogelberg, *Muir*, 1463.—OUDTSHOORN DIV.: Oudt-

shoorn, *Britten* 29.—GEORGE DIV.: banks of streams, *Bowie* 22.—KNYSNA DIV.: Bidouw River at Plettenberg Bay, *Bowie* 23, *Rogers* 28401; between Kruis River and Diep River, *Fourcade* 3482.—UNIONDALE DIV.: Long Kloof, *Burchell* 4913, 4991, *Fourcade* 2945, 3370; Uniondale, *Paterson* 3017; hills south of De Vlugt, *Fourcade* 3767; Prince Alfred's Pass, *Fourcade* 1270; Haarlem, *Fourcade* 3608; Lauterwater, *Compton* 4876, 10471; Kouga River, *Compton* 5146; Ongelegen, *Compton* 10538.—HUMANSDORP DIV.: Kromme River, *Drège* 3971; Elandsfontein at Kromme River, *Niven* 37; near Humansdorp, *Fourcade* 1364.—UITENHAGE DIV.: Elands River, *Ecklon in Berlin Herb.*; Van Stadensberg, *Ecklon and Zeyher* 1045, in *Trin. Coll. Herb.*, *Dublin* 900.—PORT ELIZABETH DIV.: Zwartkops River, Springfields, *Forest Dept.* 120.—GRAAFF-REINET DIV.: Oudeberg, *Bolus* 594; Overkantberg, *Bolus* 824.—SOMERSET EAST DIV.: Commadagga, *Burchell* 3313; summit of the Boschberg, *MacOwan* 2816, in *Herb. Norm. Austr.-Afr.* 716, *Scott Elliot* 595.—ALBANY DIV.: without precise locality, *Cooper* 1547, *Atherstone* 64; hills around Grahamstown, *Zeyher* 900, *MacOwan* 64, *Schlechter* 2678, *Bennie* 502, *Rogers* 3372, *Dyer* 49, *Daly and Sole* 28, 131; Bothasberg, *Ecklon and Zeyher* 1046; Bushman's River Heights, *Zeyher* 2224; Bridge Road, *Dyer* 918, 919.—KING WILLIAM'S TOWN DIV.: Perie, *Sim* 2010.—MACLEAR DIV.: between Elliot and Maclear, *Bolus* 8830; Gatberg, *Flanagan* 2668.—TRANSKEI: Ntsubane, *Fraser in Forest Dept. Herb.* 5323.

**Pondoland:** without precise locality, *Bachmann* 855, 858, 1661, 1690; waterfall near Baboon Spruit, *Bachmann* 1692; summit of Devil's Peak, St. John's, *Galpin* 3483; Umkwani River, *Tyson* 2644.

**Natal:** without precise locality, *Gerrard and McKen* 2, *Gueinzius* 144, *Sanderson* 720, *Rehmann* 8170; Inanda, *Wood* 1206; Groenberg, *Wood* 1294; Pinetown, *Wood* 649; Ingoma, *Gerrard and McKen* 1479; Krantskloof, *Haygarth in Stell. Univ. Herb.* 247; near Murchison in Alfred County, *Wood* 3114; Fairfield and Dumisa in Alexandra County, *Rudatis* 911; Umbilo Waterfall, *Rehmann* 8170; Spitzkop, *Empangweni, Thode in Stell. Univ. Herb.* 8482; Westville near Durban, *Thode in Stell. Univ. Herb.* 6520; near estuary of Tzotsha River, *Thode in Stell. Univ. Herb.* 5018.

**Transvaal:** BARBERTON DIV.: Poverty Creek, Elands Valley, *Thorncroft in Nat. Herb. of S.A.* 11149.—RUSTENBERG DIV.: Magaliesberg, *Engler* 2843d.—LYDENBURG DIV.: MacaMac Falls, *Burt Davy* 1451; Dullstrom, *Galpin in Bolus Herb.* 21866; Mt. Anderson, *Galpin in Bolus Herb.* 21333.

**Southern Rhodesia:** Chimanimani Mountains, 7,000 feet alt., *Swynner-ton* M32a.

In regard to the type of this species it is worth noting that Willdenow did not mention any material gathered in the wild state. He referred only to a plant in cultivation. Those specimens in the Botanical Museum, Stockholm, which were produced in cultivation may have been taken from the plant mentioned by Willdenow.

2. *P. wittebergensis*, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis breve cano-pubescentibus dense foliatis; foliis linearibus acutis basi rotundatis vel acutis supra laevibus, marginibus arte revolutis paulum tuberculatis; capitulis singulis plerumque 6—8-floris; bracteis lanceolatis extus cano-pubescentibus: floribus stipitatis extus dense cano-pubescentibus; tubo late cyathiformi; disco carnoso; sepalis ovatis planis; petalis sub sinibus calycis insertis, lamina orbiculata, ungue subaequilongo cuneato; ovario turbinato hirsuto; stylo brevi trigono; stigmatibus obtuse trilobato.

A much branched shrub about 60 cm. high, with ascending, wiry branches. Branchlets clothed with short, grey pubescence. Leaves closely set, about 1 cm. long: lamina linear, acute, often apiculate, rounded or tapered at base, with closely revolute margins entirely covering the lower surface; upper surface convex, smooth, shiny, more or less tubercled and at first pubescent on the margins: petiole 1—2 mm. long. Capitula solitary on short branchlets, 5—6 mm. wide, usually 6—8 flowered, subtended by long leaves. Bracts of the lower flowers foliaceous and much exceeding them: upper bracts lanceolate, about as long as the flowers, covered with white pubescence on the outer surface. Bracteoles 2, linear-lanceolate, dorsally pubescent. Flowers stipitate, about 3 mm. long, with a close covering of white pubescence on the outer surface: calyx-tube 0.75 mm. deep, broadly cyathiform, almost filled with a fleshy disc having a free upper margin: sepals 1.5 mm. long, ovate, acute, flattened. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina cucullate, orbicular. claw about as long, cuneate. Anthers reniform, 1-celled. Ovary turbinate, with longer, straighter pubescence than on the calyx. Style 0.5 mm. long, stout, trigonous. Stigma wider than the style, obtusely 3-lobed.

**South Africa: Cape Province.**—LAINGSBURG DIV.: summit of the Witteberg, 5,000 feet, *Compton* 2775 (type, in Bolus Herb.), 2952.

The affinity of this species is with *P. paniculata*, Willd. from which it differs in leaves and in the flowers being stipitate.

3. *P. oleaefolia*, Vent., *Jard. Maln.* sub tab. 57 (1803): *P. spicata*, Lodd., *Bot. Cab.* tab. 323 (1819) non Linn.: *P. orientalis*, Loisel., *Herb. Amat.* iv, tab. 233 (1820); [*Du Mont de Cours.*, *Bot. Cult.* ed. 2, vi, 275 (1811) nomen; Willd., *Enum. Hort. Berol.* Suppl. 12 (1813) absque descr.]; Link, *Enum. Hort. Berol.* i, 230 (1821); DC., *Prodr.* ii, 38



(1825); *Don, Gen. Syst.* 43 (1832): **P. oleoides**, *DC., Prodr.* ii, 36 (1825): *Sond. in Harv. et Sond. Fl. Cap.* i, 483 (1860) incl. var.; *Notizbl. Bot. Gart. Berlin App.* xi, 18, figs. E, F (1903); *Engler et Drude, Veget. der Erde* ix, i, 2, fig. 422, E, F (1910): **Soulangia oleaeifolia**, *Brongn., Mem. Rhamnées* 71 (1826); in *Ann. Sc. Nat. ser. i, x*, 378 (1827); *Don, Gen. Syst.* ii, 42 (1832): **S. orientalis**, *Sweet, Hort. Brit. ed. 2*, p. 115 (1830); *Don, Gen. Syst.* ii, 43; *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 389 (1839).

A much branched rigid shrub, 1—1.5 m. high. Branchlets wiry, clothed with very short, grey pubescence. Leaves mostly rather widely set, ascending, 1.5—2.5 cm. long, or slightly more or less: lamina elliptic, ovate elliptic, lanceolate or oblong-lanceolate, acute, mucronulate, rounded or tapered at base, with slightly revolute margins; upper surface widely rounded across, minutely and closely tubercled, glabrous; lower surface almost entirely exposed, covered with white tomentum, with evident secondary nerves: petiole 2—3 mm. long. Racemes 0.5—1.5 cm. long, terminal or axillary, sometimes clustered in small panicles, lax, tomentose on the rachis. Bracts caducous, lanceolate, about as long as the pedicels. Pedicels 2—3 mm. long, tomentose, often with 1 or 2 minute bracteoles about the middle. Flowers about 2.5 mm. long, clothed with white tomentum on the outer surface: calyx-tube 0.5 mm. deep, broadly campanulate, almost filled with a fleshy disc: sepals 1 mm. long, deltoid-ovate, with a raised median nerve. Petals 0.75—1 mm. long, inserted at the mouth of the tube: lamina orbicular, cucullate: claw about as long, oblong. Anthers 1-celled. Ovary obconic. Style 0.25 mm. high, broadly conical. Stigma with humps. Fruit 8—10 mm. long, considerably developed upwards so as to appear almost half superior, widely turbinate, somewhat 3-sided, with a very wide, convex calyx-area and with 10 longitudinal ridges each terminating in a boss.

**South Africa:** without precise locality, *Thunberg, Sparman in Bot. Mus., Stockholm, Drège* 1919, *Ecklon* 1048.

**Cape Province**—MALMESBURY DIV.: Riebeeck Kasteel, *Niven* 40, *Levy's* 3110.—TULBAGH DIV.: Roodczand Kloof, *Burchell* 1005; *Witsenberg, Burchell* 8672; Tulbagh Kloof, *Drège* 6777, *MacOwan in Herb. Norm. Austr.-Afr.* 207, *Bolus* 5058, *Preiss*; Tulbagh Waterfall, *Zeyher* 327, *Ecklon and Zeyher* 1048, *Mund*; Tulbagh, *Berg, Marloth* 2859; Saron, *Thode in Stell. Univ. Herb.* 5021.—PIQUETBERG DIV.: Piqueniers Kloof, *Schlechter* 7943, *Pearson in Sladen Mem. Exped.* 5155; near Piquetberg, *Bolus in Bolus Herb.* 13529; Piquetberg, *Guthrie* 2570; near Porterville, *Edwards* 82; Mouton's Vley, *Pillans* 7222; near Redlinghuys, *Pillans* 7688; Muis Hoek Berg, *Pillans* 8593.—CERES

Div.: Michell's Pass, *Marloth* 1697.—CLANWILLIAM DIV.: Heerenlogement, *Zeyher* 327, *Nouhuys* 57, *Compton* 10952; near Kriedouw, *Leryns* 1304, *Nouhuys* 12: hills north of Hex River, *Pearson in Sladen Mem. Exped.* 5257; Warm Baths, *Stephens in Sladen Mem. Exped.* 7307, *Compton* 5384; south slopes of Pakhuis Pass, *Pillans* 7080, *Penfold* 218; Zeekoc Vley, *Pillans in Bolus Herb.* 21864; near Clanwilliam, *Diels* 372.—VAN RHYNSDORP DIV.: Matsikamma, *Compton* 7236.—CALVINIA DIV.: Hantam, *Meyer in Berlin Herb.*—NAMAQUALAND: Stoffkraal, *Zeyher* 326; Garies, *Caporn in Bolus Herb.* 16140.

After the flowering the upper half of the ovary develops so considerably that by the time it has attained to the condition of a mature fruit it has the remnant of the calyx-tube around or shortly above its middle and appears as half superior or almost so.

4. **P. polifolia**, comb. nov.: **Rhamnus polifolia**, *Vahl, Symb. Bot.* iii, 41 (1794)!: **P. thymifolia**, *Vent., Jard. Malm.* i, tab. 57 (1803): **P. rosmarinifolia**, *Thumb., Diss. Phylica* 8 (1804)!: *Du Mont de Cours., Bot. Cult.* ed. 2, vi, 271 (1811); *Roxb. in Beats. Tracts St. Helena* 316 (1816); *Thumb., Fl. Cap.* 87 (1818); ed. 2, p. 203 (1823): **P. ramosissima**, *DC., Prodr.* ii, 34 (1825); *Spreng., Syst. Veg.* iv, pt. 2, p. 108 (1827); *Hook., Ic. Pl.* tab. 1051 (1867); *Melliss, St. Helena* tab. 32 (1875): **Soulangia thymifolia**, *Brongn. in Ann. Sc. Nat.* ser. 1, vol. X, p. 378 (1827); *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 381 (1839); *Presl., Bot. Bemerk.* 38 (1844): **Trichocephalus ramosissimus**, *Don, Gen. Syst.* ii, 40 (1832).

A much branched shrub of about 4 m. in height or a tree occasionally up to 10 m. in height. Branchlets clothed with grey tomentum. Leaves 2—4 cm. long, well spaced: lamina erect-spreading, elliptic, oblong-elliptic or oblong, acute, rounded at base, mostly open-backed, with slightly revolute margins; upper surface slightly convex or rounded, with impressed midrib and secondary nerves, minutely scabrid, drying blackish, at first thinly covered with short, grey tomentum; lower surface almost entirely exposed, closely covered with grey tomentum, with evident secondary nerves: petiole about 3 mm. long. Flowers 2—2.25 mm. long, shortly stipitate, in very shortly peduncled clusters of about 3 in the axils of the upper leaves. Bracts about 1 mm. long, acicular, 2 in each flower-cluster. Bracteoles absent. Calyx-tube broadly cyathiform, tomentose on the outer surface, filled with a fleshy disc having a free outer margin: sepals 0.75—1 mm. long, ovate, acute; outer surface grey-tomentose, occasionally shortly bearded at the apex; inner surface convex at the apex, with a prominent midrib. Petals inserted at the mouth of the tube, scarcely 0.5 mm. long; lamina orbicular, cucullate: claw about a third as long, cuneate. Anthers

1-celled. Ovary obconic, covered with grey tomentum: style short, trigonous: stigma obtusely 3-lobed. Fruit rotundate, glabrous and blackish when mature, with a rather small depressed area on the summit.

**South Atlantic Ocean:** St. Helena; without precise locality, *Masson*, *General Walker*, *Nullip*, *Melliss*; Longwood, *Burchell* 81.

On the island of St. Helena this plant is known as "Wild Rosemary".

5. **P. arborea**, *Aubert du Petit Thouars*, *Fl. Tristan d'Acugn.* 45 (1811): *Carmichael* in *Trans. Linn. Soc.* xii, 505 (1817); *DC.*, *Prodr.* ii, 37 (1825); *Linn.*, *Syst. Veg.* ed. 16, i, 828 (1825); *Don*, *Gen. Syst.* 43 (1832): *D. Dietr.*, *Syn. Pl.* i, 875 (1839); *Valdivia Exped.* Bd. ii, pt. 1, p. 194 (1905): **Soulangia arborea**, *Don*, l.c.; *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 388 (1839): **Phyllica superba**, *Hort. ex A. Dietr.* l.c.

A shrub or small tree up to 7 m. high, with a stem up to 40 cm. thick, usually much branched and dense in the upper parts. Branchlets clothed with grey tomentum consisting of long and short hairs. Spreading closely set, 0.8—1.8 cm. long: lamina erect-spreading or spreading, at length somewhat declinate, lanceolate or ovate-lanceolate, acute, rounded at base, slightly incurved above the middle, with revolute margins covering a half or much less of the lower surface; upper surface minutely tubercled on the margins and often also on the midrib, pilose on those parts or, less often, over the whole area with deciduous, grey hairs: petiole 1.5—2 mm. long. Inflorescence thyriform, rounded or oblong, usually dense, 1—2.5 cm. long. Flowers about 2.5 mm. long, stipitate, in shortly peduncled clusters of 3—8, subtended by 2 short, acicular, villous bracteoles; outer surface densely tomentose with long, grey hair: calyx-tube 0.5—0.75 mm. deep, broadly cyathiform, with a fleshy disc having the outer margin free: sepals (often 4 to 6) 1—1.5 mm. long, ovate, acute, convex at the apex, with a prominent midrib. Petals inserted at the mouth of the tube, 0.5—1 mm. long: lamina cucullate, rotundate or orbicular: claw from a third to about as long, cuneate. Anthers 1-celled. Ovary obconic. Style scarcely 0.5 mm. long, trigonous. Stigma obtusely 3-lobed. Fruit 5—6 mm. long, rotundate or sphaerical, often somewhat trigonous, glabrous, blackish.

**South Atlantic Ocean:** Tristan d'Acunha, *Carmichael*, *MacGillivray* 357, *Milne*, *Gane*, *Bonomi* 20, *Keytel* in *S. Afr. Mus. Herb.* 1796, in *Marloth Herb.* 4721, *Dyer* 3552; Gough Island, *Rudmose Brown*; Nightingale Island, *Moseley*, *H.M. Rogers*; Inaccessible Island, *Moseley*.

**Indian Ocean:** Mauritius, *Groendal*; Amsterdam Island, *French Expedition of 1874-5 to the Islands of St. Paul and Amsterdam* No. 16, *Commander Perry* 1, *Commander Corrie*, *Schimper*.

The affinity of this species with *P. polifolia* is certainly close, but it differs in having the leaves more crowded, with larger flowers and with longer hairs on the leaves and flowers.

6. *P. mauritiana*, *Bojer ex Baker, Fl. Maurit.* 53 (1877): [*Bojer, Hort. Maurit.* 70 (1837) absque descr.].

A much branched shrub, up to 2 m. high, stout in the lower parts. Branchlets wiry, with a dense covering of silky pubescence. Leaves closely set, 5—10 mm. long: lamina erect-spreading or spreading, often becoming declinate, oblong or lanceolate-oblong, obtuse, apiculate, rounded at base, with revolute margins covering the lower surface except for the midrib: upper surface minutely wrinkled, shiny, with a deeply impressed midrib, at first covered with silky, grey pubescence: petiole about 2 mm. long. Capitula 0·5—1 cm. wide, hemisphaeric or rotundate, densely many-flowered, solitary or clustered, subtended by several spreading leaves. Bracts of the inner flowers 3—4 mm. long, oblong, acute, densely villous. Braeteoles 2, linear, villous, usually absent. Flowers 2·5 mm. long, stipitate, with a dense covering outside of long, ascending, silky, grey hairs, glabrous within: calyx-tube broadly cyathiform, filled with a fleshy disc having the outer margin raised above the base of the sepals: sepals 1—1·25 mm. long, ovate, acute, convex on the inner surface at the apex. Petals inserted at the mouth of the tube, 0·5 mm. long: lamina orbicular, cucullate: claw half as long, linear-cuneate. Anthers 1-celled. Ovary obconic. Style 0·5 mm. long, conical. Stigma with 3 obtuse lobes.

**Madagascar:** without precise locality, *Chapelier in Kunth Herb.*

**Mauritius:** without precise locality, *Commerson in Paris Herb., Boivin* 1383, *Kersten in Berlin Herb.*, *J. Horne in Kew Herb.*, *J. B. Balfour in Kew Herb.*, *Richard in Trin. Coll. Herb.*

**Reunion:** without precise locality, *Kersten in Berlin Herb.*

**Var.  $\beta$ , linearifolia (Pillans):** branches and branchlets slenderer; leaf-lamina linear, soon becoming glabrous on the upper surface: flowers with a covering outside of short pubescence: petals with a broadly ovate lamina and oblong claw; fruit wrinkled, sparsely villous, blackish.

**Mauritius:** without precise locality, *Commerson in Paris Herb.*

The type collecting of the species was made by Bojer in Mauritius.

7. *P. emirnensis*, comb. nov.: *Tylanthus emirnensis, Tulasne in Ann. Sc. Nat. ser. iv, vol. viii, 128 (1857)!*

A low shrub with ascending wiry branches. Branchlets covered with grey tomentum with which is mingled long, silky hair. Leaves closely set, 7—10 mm. long: lamina erect-spreading or spreading, linear-lanceolate, obtuse or apiculate, rounded at base, with revolute margins covering about half or more of the lower surface; upper surface with

impressed nerves, otherwise smooth, at first pilose with grey hairs on the midrib and margins: petiole about 1 mm. long. Capitula about 1 cm. wide, few-flowered, subtended by several leaves. "Bracts few, linear-oblong, acute, pilose and tomentose" (Tulasne). Flowers about 3.5 mm. long, on a villous stipe: calyx-tube 1 mm. deep, campanulate, sparsely pilose on the outer surface with long, ascending, white hairs: sepals 1 mm. long, ovate, flattened, sharply convex at the apex, with the upper half of the midrib prominent: outer surface covered with long, spreading, white hairs up to 1.5 mm. long; inner surface glabrous. Petals inserted in the mouth of the tube, 1 mm. long, oblanceolate, acute, or obovate-oblanceolate, concave on the inner side, slightly incurved above the middle. Anthers 1-celled. Ovary narrowly obconic, villous. Style, stigma and fruit not seen.

**Madagascar:** mountains in the province of Emirna, *Bojer in Berlin Herb.*

**Var.  $\beta$ , nyasae** (*Pillans* var. nov.); leaf-lamina mostly incurved, slightly scabrid and often pitted on the margins, less frequently with impressed nerves on the upper surface; petiole 2 mm. long; capitula up to 1.5 cm. wide; bracts of the inner flowers about 5 mm. long, linear, densely villous on the outer surface; bracteoles 2 or 1, 2—4 mm. long, acicular or setaceous, villous; flowers 4—4.5 mm. long, densely covered outside with long, ascending, white, silky hairs; calyx-tube cyathiform, with an immersed disc partly projecting to form a ledge around the middle; petals oblanceolate, obtuse; anthers reniform; style 0.5 mm. high, stout, trigonous; stigma divided into 3 rounded lobes; fruit 6 mm. long, stipitate, wrinkled, more or less silky-villous, blackish.

**Nyasaland:** Kingeberg, about 8,100 ft., *W. Goetze* 963 (in Berlin Herb.).

8. **P. Bathiei**, sp. nov. Ramulis rigidis villosis dense foliatis; foliis lanceolato-linearibus attenuatis apiculatis basi rotundatis supra laevibus primum villosis, marginibus arte revolutis; capitulis singulis hemisphaericis paucifloris; bracteis foliaccis infra medium utrinque villosis; floribus sensim stipitatis extus cano-villosis; tubo cyathiformi; sepalis deltoideo-ovatis apice convexis; petalis sub sinibus calycis insertis oblanceolatis acutis naviculari-concavis; ovario turbinato; stigmatibus subsessili trilobato.

Branchlets erect, wiry, clothed with spreading, silky, grey hairs. Leaves closely set, 1—1.8 cm. long: lamina ascending or erect-spreading, slightly incurved, lanceolate-linear, attenuate, apiculate, rounded at base, with closely revolute margins covering most of the lower surface; upper surface smooth, at first covered with grey, silky hairs, becoming glabrous: petiole about 2 mm. long. Capitula solitary, about 1 cm.

wide, few-flowered, hemisphaeric, surrounded and considerably overtopped by accompanying leaves. Bracts 6—8 mm. long, foliaceous, silky-villous on both sides of the lower half. Bracteoles 2, 3—4 mm. long, acicular, silky-villous. Flowers 3—4 mm. long, on a stipe 1 mm. long, with a dense covering of silky, white hairs: calyx-tube 1 mm. deep, cyathiform: sepals 1 mm. long, deltoid-ovate, acute, convex at the apex, keeled up the middle. Petals inserted at the mouth of the tube, 1 mm. long, oblanceolate, acute, navicular-concave. Anthers reniform, 1-celled. Ovary turbinate. Style 0.5 mm. long, stout, trigonous. Stigma divided into 3 small, rounded lobes. Fruit about 6 mm. long, rotundate, pilose.

**Madagascar:** without precise locality, *Bathie* 7392 (in Paris Herb.).

There is a close affinity of this species with *P. emirnensis* from which it may be distinguished by attenuate, more erect leaves, by the capitula being overtopped by the accompanying leaves and by the dense, hairy covering on the outer surface of the tube.

9. ***P. tropica***, *Baker in Kew Bull* (1898) 302!

A shrub about 40 cm. high, with many ascending, wiry branches. Branchlets slender, virgate, covered with grey tomentum with which are mixed spreading, silky hairs. Leaves crowded, 1—1.4 cm. long: lamina erect-spreading or spreading, very slightly incurved, lanceolate, acute, rounded at base, with revolute margins covering about half of the lower surface; upper surface smooth, at first pilose up the midrib and margins, often with the lateral nerves impressed: petiole about 2 mm. long. Capitula solitary, 1.3—1.5 cm. wide, hemisphaeric, few-flowered, with the base surrounded by several leaves. Bracts about 7 mm. long, linear, acute, densely covered on both sides and much overtopped by long, straight, white hairs. Bracteoles 3, similar but smaller. Flowers about 5 mm. long, on a villous stipe 1 mm. long: calyx-tube about 1 mm. deep, campanulate, sparsely villous on the outer surface, glabrous within: sepals 1.5 mm. long, ovate, acute; inner surface flattened, glabrous; outer surface densely covered with coarse, spreading, white hairs up to 2 mm. long. Petals inserted half way up the tube, 1 mm. long: lamina elliptic-ovate, acute, concave on the inner side, slightly incurved: claw about as long, linear, channeled up the inner side: or the entire petal oblanceolate, concave on the inner side. Anthers 1-celled. Ovary narrowly obconic, with a dense covering of long, white, ascending hairs. Style 0.5 mm. long, narrowly conical. Stigma divided into 3 rounded lobes. Fruit about 6 mm. long, rotundate, sparsely pilose, chestnut-brown.

**Nyasaland:** South Nyika mountains, *Whyte* 41 (alt. 4,000-7,000 feet); Mlanji (6,000 feet alt.), on Fuchila Plateau, *Purves* 24.

There is a very close affinity with *P. emirnensis*. Further collecting may prove the present species to be a variety.

10. *P. apiculata*, *Sond. in Harv. et Sond. Fl. Cap. i*, 497 (1860)!

A moderately branched shrub about 60 cm. high. Branchlets slender, clothed with grey pubescence and furnished with scattered, long hairs. Leaves well spaced, 0.7—1.4 cm. long: lamina erect-spreading, linear-lanceolate, very acute, apiculate, widely rounded at base, with revolute margins covering about half of the lower surface; upper surface smooth, minutely tubercled on the margins, pilose on the midrib and margins: petiole 1.5—2 mm. long. Capitula solitary or occasionally paniced, about 1 cm. wide, hemisphaeric, surrounded at base by foliaceous bracts. Bracts of the inner flowers about 3 mm. long, linear or setaceous, villous on the dorsal surface. Bracteoles 2, setaceous, sometimes absent. Flowers 3—3.5 mm. long, on a villous stipe: calyx-tube about 0.5 mm. deep, cyathiform, glabrous: sepals 1 mm. long, deltoid-ovate, acute; outer surface covered with long, grey hairs; inner surface glabrous, with a prominent median ridge at the apex diminishing downwards. Petals inserted at the mouth of the tube, 0.5—0.75 mm. long: lamina cucullate, orbicular: claw about as long, cuneate. Anthers 1-celled. Ovary obconic, glabrous. Style stout, 0.5 mm. long. Stigma subcapitate.

**South Africa:** without precise locality, *Gueinzus in Bot. Mus., Stockholm*.

**Cape Province**—CALEDON DIV.: "mountains in the province of Caledon," *Zeyher in S. Afr. Mus. Herb.* 15030.

11. *P. Guthriei*, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis tomentosis villosisque; foliis lanceolatis attenuatis basi rotundatis, marginibus revolutis minute pustulatis; capitulis depressoglobosis; floribus stiputatis; tubo late cyathiformi glabro; sepalis deltoideo-ovatis planis apice carinatis extus villosis; petalis sub sinibus calycis insertis, lamina rotundata cucullata, ungue subequilongo oblongo; ovario obconico glabro; stigmatе sessili.

A much branched shrub about 60 cm. high, rigid in the lower parts. Branchlets wiry, virgate, clothed with short grey tomentum and longer silky hairs. Leaves closely set, 1—2.5 cm. long: lamina erect-spreading, lanceolate, attenuate, apiculate, rounded at base, somewhat incurved, with revolute margins covering half or more of the lower surface; upper surface minutely pustulate on the margins, at first pilose on the margins and up the middle, soon becoming glabrous: petiole about 1.5 mm. long, stout, villous. Capitula 4—6 mm. wide, depressed-globose, subtended by several modified leaves with expanded petioles, solitary or on leafless or almost leafless, short branchlets and clustered.

Bracts about 2.5 mm. long, linear, densely villous on the dorsal surface. Bracteoles shorter, acicular, similarly villous. Flowers stipitate, 2.5—3 mm. long: calyx-tube about 0.75 mm. deep, broadly cyathiform, glabrous: sepals scarcely 1 mm. long, deltoid-ovate, flattened on the upper surface except for a keel at the apex, densely white-villous on the lower surface. Petals 0.5 mm. long, inserted at the mouth of the tube: lamina rotundate, cucullate: claw about as long, oblong. Anthers reniform, 1-celled. Ovary obconic, glabrous. Stigma sessile, pulvinate.

**South Africa: Cape Province**—PAARL DIV.: French Hoek, upper part of the French Hoek Pass, *Guthrie* 3742, in *Bolus Herb.* 18677 (type).

A distinct species with some relation to *P. apiculata*, *Sond.* in floral characters, differing, however, very much in its leaves.

12. ***P. natalensis***, sp. nov. Frutex ramosissimus circiter 50 cm. altus; ramulis minute tomentosis villosisque dense foliatis; foliis linearibus vel lanceolato-linearibus apiculatis basi rotundatis supra minute scabridis, marginibus arte revolutis; racemis capituliformibus; floribus axillaribus extus cano-tomentosis; tubo late cyathiformi; sepalis deltoideo-ovatis supra medium carinatis; petalis sub sinibus calycis insertis, lamina rotundata cucullata; ungue brevi cuneato-oblongo; ovario obconico; stylo columnari; stigmatate brevi trilobato.

A much branched shrub, about 50 cm. high, with ascending, wiry branches. Branchlets slender, minutely tomentose and shortly villous. Leaves closely set, 0.7—1.4 cm. long: lamina erect-spreading or spreading, somewhat incurved, linear or lanceolate-linear, apiculate, rounded at base, with revolute margins covering most of the lower surface; upper surface minutely scabrid, at first covered with adpressed, grey pubescence, at length glabrous: petiole 1—1.5 mm. long. Inflorescence a capituliform raceme, 0.5—1 cm. long. Flowers about 3.5 mm. long, uniformly covered outside with white tomentum and shaggy hair, on tomentose pedicels about 2 mm. long, in the axils of reduced leaves. Bracteoles absent. Calyx-tube 0.5 mm. deep, broadly cyathiform, lined up to the sinuses with a conspicuous disc. Sepals 1—1.25 mm. long, deltoid-ovate, acute, keeled down the upper half of the inner surface. Petals inserted at the mouth of the tube, 0.75 mm. long: lamina rotundate, deeply concave, cucullate: claw half as long, cuneate-oblong. Anthers cordate, 1-celled. Ovary obconic. Style 0.5—0.75 mm. long, columnar. Stigma narrower, shortly 3-lobed.

**South Africa: Natal**—ALEXANDRA COUNTY: hill on the south side of the Ifafa River, *Gerard and McKen* 1878—ALFRED COUNTY: near the Tyunga River, stony places, alt. c. 50 ft., *Thode in Natal Govt. Herb.* 16094, in *Stell. Univ. Herb.* 5019 (type)—ZULULAND: without precise locality, *Gerard*.



There is an evident relationship of this species to *P. pinea*, Thunb., but it differs with a much shorter claw on the petals and with a well developed style.

13. **P. Thodei**, *Phill. in Kew Bull.* 1925, p. 362! : **P. grisea**, *Markotter in Ann. Stell. Univ.* viii, 30 (1930)!

A much branched, rather rigid shrub, up to 60 cm. high, with ascending branches. Branchlets densely covered with spreading, silky, grey hairs. Leaves crowded, 7—9 mm. long : lamina linear lanceolate or linear, obtuse, rounded at base, erect-spreading or spreading, with closely revolute margins covering the lower surface ; upper surface minutely scabrid, at first villous, tardily becoming glabrous : petiole 1—1.5 mm. long. Capitula solitary, 1—1.3 cm. wide, surrounded by leaves with enlarged petioles and by outer foliaceous bracts. Bracts of the inner flowers about 4 mm. long, linear, clothed with long, silky, white hairs on the outer surface and the upper half of the inner surface. Bracteoles absent. Flowers stipitate, 4—4.5 mm. long : calyx-tube 1 mm. deep, widely campanulate, clothed outside with long, ascending, silky hairs, with an annular ring at the base within : sepals 2 mm. long, ovate, somewhat attenuate, with a dense covering of long woolly hair on the outer surface, convex at the apex of the inner surface. Petals inserted in the mouth of the tube, 0.75 mm. long : lamina rotundate, subacute, cucullate, sometimes with a single hair at the apex : claw about as long, cuneate-linear. Anthers 1-celled. Ovary obconic, clothed with long, ascending, silky hairs. Style conical, less than 0.5 mm. high. Stigma shortly 3-lobed. Fruit 5—6 mm. long, rotundate, wrinkled, more or less villous, chestnut-brown, with a small calyx-base at the apex.

**South Africa : Natal** ; Drakensberg, Olivier's Hoek, *Thode* 15, in *National Herb. Pretoria* 2748, in *Natal Govt. Herb.* 11225, in *Stell. Univ. Herb.* 8483.—**Orange Free State** ; Zaaihoek, *Thode in Stell. Univ. Herb.* 4413.

14. **P. Galpinii**, sp. nov. Frutex ramosissimus circiter 70 cm. altus ; ramulis tomentosis ; foliis lanceolatis acutis basi obtusis vel paulum cuneatis supra minute tuberculatis sparse villosis demum glabris, marginibus arte revolutis ; inflorescentia spicata ; bracteolis deficientibus ; floribus breve stipitatis extus tomentosis ; tubo cyathiformi ; sepalis ovato-lanceolatis convexis ; petalis sub sinibus calycis insertis, lamina ovata vel elliptica incurvo-cucullata, ungue subaequilongo lineari ; ovario obconico ; stigmatibus sessilibus.

A much branched shrub, about 70 cm. high, with rather slender, ascending branches. Branchlets slender, sparsely villous and shortly tomentose. Leaves 5—8 mm. long : lamina erect-spreading, lanceolate,

acute, rounded or slightly narrowed at base, with revolute margins covering about half of the lower surface; upper surface minutely tubercled, sparsely villous, becoming glabrous: petiole about 1 mm. long. Flowers 3.5—4 mm. long, shortly stipitate, covered outside with short, white tomentum, situated in the axils of the uppermost, reduced leaves, in few-flowered, capituliform spikes 5—7 mm. wide. Bracteoles absent. Calyx-tube about 0.75 mm. deep, cyathiform: sepals 1.5—1.75 mm. long, ovate-lanceolate, subacutely angular-convex on the inner surface above the middle. Petals inserted at or shortly below the mouth of the tube, 0.75 mm. long: lamina incurved-cucullate, ovate or elliptic, acute or obtuse, with incurved margins: claw about as long, linear. Anthers reniform, 1-celled. Ovary distinct from the calyx-tube, obovate. Style and stigma together 0.5 mm. long, trigonous.

**South Africa: Cape Province**—QUEENSTOWN DIV.: summit of Katberg Head, alt. 5,800 ft., *Galpin* 8354 (type, in Bolus Herb.), *Young in Moss Herb.* 16731.—VICTORIA EAST DIV.: between Alice and the Katberg, *Young in Moss Herb.* 17520; Hogsback, *Ratray* 64, 219.

The affinity of this species is with *P. Thodei*, *Phill.*, from which it differs by being smaller in all parts.

15. ***P. buxifolia***, *Linn., Sp. Pl.* 195 (1753)! ed. 2, p. 283 (1762); *Linn., Syst. Nat.* ed. 10, ii, 938 (1759); ed. 12, ii, 180 (1767); *Mill., Gard. Dict.* ed. 8 (1768); *Burm. f., Fl. Cap. Prodr.* 6 (1768); *Linn., Syst. Nat.* ed. 13, ii, 180 (1770); *Linn., Syst. Veg.* ed. 13, p. 196 (1774); ed. 14, p. 235 (1784); *Ait., Hort. Kew.* i, 269 (1789); *Lam., Illus.* ii, 79 (1793); *Thunb., Prodr. Cap.* 45 (1794); *Linn., Syst. Veg.* ed. 15, p. 246 (1797); *Willd., Sp. Pl.* i, p. 1111 (1798); *Poir. in Lam. Encycl. Bot.* v, 292 (1804); *Pers., Syn. Pl.* i, 245 (1805); *Wendl., Collect.* i, 75, tab. 26 (1808); *Willd., Enum. Hort. Berol.* 253 (1809); *Ait., Hort. Kew.* ed. 2, ii, 21 (1811); *Du Mont de Cours., Bot. Cult.* ed. 2, vi, 274 (1811); *Roem. et Schultes, Syst. Veg.* v, 487 (1819); *Link, Enum. Hort. Berol.* i, 230 (1821); *Thunb., Fl. Cap.* ed. 2, p. 204 (1823); *Lodd., Bot. Cab.* tab. 848 (1824); *Linn., Syst. Veg.* ed. 16, p. 828 (1825); *DC., Prodr.* ii, 36 (1825); *D. Dietr., Syn. Pl.* i, 875 (1839); *Richter, Syst. Gen. et Sp.* 212 (1840); *Sond. in Harv. et Sond. Fl. Cap.* i, 482 (1860); *Deutsch Tiefsee-Exped.* 1898-99, ii, pt. 3, fig. 35, 2 (1908): [***Alaternoides africana chamaesmespili folio rigidior et minore***, *Comm., Praelud.* 62, t. 12 (1703): ***Chamaelea folio subrotundo subtus incano***, *Burm., Rar. Afr. Pl.* 119, tab. 44, fig. 1 (1738)]: ***Phylica cordata***, *Linn., Sp. Pl.* ed. 2, 283 (1762)!; *Lam., Illus.* ii, 79; *Willd., Sp. Pl.* i, 1111; *Poir. in Lam. Encycl. Bot.* v, 292; *Pers., Syn. Pl.* i, 245; *Ait., Hort. Kew.* ed. 2, ii, 21; *Link, Enum. Hort. Berol.* i, 230; *Roem. et Schultes, Syst. Veg.* v, 487; *Linn., Sp. Pl.* ed. 16, i, 828, excl. syn.; *DC., Prodr.* ii,

36; *D. Dietr.*, *Syn. Pl.* i, 875; *Richter, Syst. Gen. et sp.* 212: **P. cordifolia**, *Salisb., Prodr.* 140 (1796) absque descr.: **P. callosa**, *Du Mont de Cours., Bot. Cult.* ed. 2, vii, 328 (1814); **Soulangia buxifolia**, *Brongn., Mem. Rhom.* 36 (1826); in *Ann. Sc. Nat.* x, 378 (1827); *Don., Gen. Syst.* ii, 42 (1832); *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 387 (1839): **S. cordata**, *Brongn., op cit.* 71; in *Ann. Sc. Nat.* x, 378; *Don, l.c.*

A much branched stout shrub up to 3 m. high. Branchlets clothed with buff-coloured, velvety pubescence. Leaves well spaced, mostly 1.5—2.5 cm. long: lamina erect-spreading, ovate or elliptic, subacute, rounded or subcordate at base, with slightly revolute margins; upper surface finely tuberculate-scabrid, with impressed nerves, at first pubescent, soon becoming glabrous; lower surface exposed, with evident secondary nerves, covered with felt-like tomentum: petiole about 2 mm. long. Capitula 4—7 mm. wide, flattened above, comparatively few-flowered, terminating slender, leafless branchlets 0.5—2 cm. long or sessile on the main axis, usually assembled in short panicles. Bracts of the outer flowers foliaceous, those of the inner shorter, pubescent. Bracteoles absent. Flowers 2—3 mm. long, shortly stipitate, covered outside with short, cream-coloured tomentum, glabrous within: calyx-tube broadly cyathiform, almost filled with a fleshy disc, having a free outer margin: sepals 1.25—1.5 mm. long, ovate, acute, flattened, slightly gibbous at the apex. Petals inserted at the mouth of the tube, 0.75—1 mm. long: lamina cucullate, rotundate: claw about as long or shorter, cuneate. Anthers 1-celled. Ovary broadly obconic. Style scarcely 0.5 mm. long, stout, trigonous. Stigma consisting of 3 short lobes. Fruit 8—10 mm. long, rotundate, with a wide, flattened area on the summit, covered with short tomentum.

**South Africa:** without precise locality, *Oldenburg, Thunberg, Banks, Sparrman, Berg, Sieber* 69, *Drege* 9535, *Niven, Lehmann, Bowie, Admiral Grey, C. Wright, Wahlberg.*

**Cape Province**—CAPE DIV.: without precise locality, *Ecklon and Zeyher* 1047; *Camp's Bay, Burchell* 366, *Zeyher* 112, *MacOwan* 2459, *Schlechter* 7830; west slopes of Lion's Head, *Burchell* 837, *Tyson* 2376, 2378, *Thode in Stell. Univ. Herb.* 7979; Table Mountain, *Drège, Alexander, Harvey, Wilms* 3119, *Bolus* 2744, *Bolus in Bolus Herb.* 18696, *MacOwan in Herb. Norm. Austr.-Afr.* 131, *Scott Elliot* 1044, *Engler* 95, 107, *Rogers* 2455, *Dümmer* 1326; ravine between Table Mountain and Lion's Head, *Ecklon* 108; near the waterfall, Devil's Peak, *Zeyher* 78; upper slopes at Kirstenbosch, *Compton* 10678; above the blockhouse, Devil's Peak, *Wolley-Dod* 37; Hout Bay Nek, *Hutchinson* 100; on the Steenberg, *Wolley-Dod* 1092; east slopes of the Muizenberg, *Guthrie* 519, *Pillans* 4851; Kalk Bay, *Gamble* 22175; *Smitswinkel, Salter* 248/6; Cape

Point, *Cameron in Stell. Univ. Herb.* 9167; Cape Flats, *Rehmann* 2018, 2019; Simon's Town, *Andersson in Stockholm Bot. Mus.*—STELLENBOSCH DIV.: "Hottentots Holland Kloof," *Burchell* 8237; Sir Lowry's Pass, *Diels* 1402; Gordon's Bay, *Guthrie* 4959, *Markotter in Stell. Univ. Herb.* 8669; Stellenbosch, *Andersson in Stockholm Bot. Mus.*—CALEDON DIV.: Houw Hoek, *Bolus in Bolus Herb.* 18698; base of mountains at Hermanus, *Galpin in Bolus Herb.* 21339; Kogel Bay, *Parker* 3499.

16. *P. fruticosa*, *Schltr. in Engl. Bot. Jahrb.* xxvii, 168 (1899)!

A much branched, rigid shrub, up to 1.5 m. high. Branchlets wiry, clothed with short, grey tomentum. Leaves ascending, 1—1.5 cm. long: lamina ovate to ovate-lanceolate, acute, widely rounded at base, slightly incurved, with revolute margins; upper surface slightly convex, closely and finely tubercled, at first puberulous; lower surface exposed except for a narrow margin, reticulate-nervose or at least with the lateral nerves evident, tomentose: petiole 1.5—2 mm. long. Capitula solitary, 6—8 mm. wide, few-flowered, flattened above, surrounded by leaves. Bracts 2.5 mm. long, linear, densely villous on the dorsal surface. Bracteoles 2, 1.5—2 mm. long, linear or acicular, villous on the dorsal surface. Flowers 2.25—2.5 mm. long, on a hirsute stipe: calyx-tube broadly obconic, 0.75 mm. deep, pilose on the outer surface, with an inconspicuous disc lining the base within: sepals 1 mm. long, deltoid-ovate, acute, erect-spreading, densely villous on the outer surface, with a ridge from the apex to the middle on the inner surface. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina ovate-rotundate, cucullate: claw less than half as long, cuneate. Anthers 2-celled, cordate, scarcely 0.5 mm. long. Ovary obconic, villous, with long, white hairs around the base. Style stout, very short. Stigma inconspicuous, conical.

South Africa: Cape Province—CLANWILLIAM DIV.: Koude Berg, *Schlechter* 8741; Cedarberg, *Stokoe* 2606; Kromme River, *Compton* 5066.

17. *P. nervosa*, sp. nov. Frutex robustus ramosissimus circiter 150 cm. altus; ramulis cano-pubescentibus dense foliatis; foliis planiusculis ovatis acutis apiculatis basi rotundatis subcordatis vel cordatis supra minute tuberculatis primum pilosis subtus tomentosis conspicue nervosis, marginibus paulum revolutis; capitulis depresso-hemisphaericis; bracteis obovatis vel oblongis extus villosis; floribus breve stipitatis; tubo cyathiformi extus sparse tomentoso; sepalis ovato-lanceolatis supra medium convexis extus dense tomentoso; petalis tubo calycis supra medium insertis, lamina orbiculari cucullata, ungue aequilongo lineari vel anguste cuneato; ovario anguste obconico glabro; stylo columnari; stigmatibus trilobato.

A stout, much branched shrub, about 150 cm. high. Branchlets slender, clothed with spreading, grey pubescence. Leaves closely set, 1—2 cm. long: lamina erect-spreading, almost entirely open-backed, ovate, acute, apiculate, rounded, subcordate or cordate at base, slightly incurved, widely convex above, narrowly revolute at the margins, with prominent midrib and secondary nerves on the tomentose lower surface; upper surface closely and minutely tubercled, at first silky-pilose, at length glabrous: petiole 1.5—2 mm. long. Capitula solitary 0.7—1 cm. wide, depressed-hemisphaeric, subtended by several leaves and with several leafy bracts on the outer edge. Bracts of the inner flowers 2.5—3.5 mm. long, obovate or oblong, acute, concave on the inner side, villous on the outer. Bracteoles 2, about as long, linear, villous on the outer surface. Flowers 3.5—5 mm. long, on a very short stipe furnished with a few straight hairs: calyx-tube 1—1.5 mm. deep, cyathiform, sparsely tomentose on the upper half or all over the outer surface: sepals 1.25—1.5 mm. long, ovate-lanceolate, acute, flattened at the base of the inner surface, thence angular-convex to the apex, densely tomentose on the outer surface. Petals inserted on the upper half of the tube well within the mouth, 0.5—1 mm. long: lamina orbicular, deeply concave, cucullate: claw as long, linear or narrowly cuneate. Anthers reniform, 1-celled. Ovary distinctly narrower than the tube, tubular-obconic, somewhat fluted, glabrous. Style 0.5—0.75 mm. long, columnar, trigonous. Stigma divided into 3 rounded lobes.

**South Africa: Cape Province**—PIQUETBERG DIV.: near Porterville, *G. Edwards in Bolus Herb.* 13443.—CERES DIV.: Schurfte Berg, near Schoongezicht, 4,700 ft., *Schlechter* 10177 (type, in *Bolus Herb.*).—CLANWILLIAM DIV.: hills a mile south-east of Keerom, *Pillans* 8819.

The affinity of this species is with *P. fruticosa*, Schltr. from which it differs by longer and narrower sepals, a longer claw on the petals, reniform, 1-celled anthers and a glabrous ovary.

18. ***P. axillaris***, *Lam., Illus.* ii, 77 (1793)!; *Poir. in Lam. Encycl. Bot.* v, 289 (1804); *Pers., Syn. Pl.* i, 245 (1805); *Du Mont de Cours., Bot. Cult.* ed. 2, vi, 272 (1811); *Spreng. in Ges. Naturf. Fr. Berl. Mag.* viii, 104, tab. 8, fig. 4 (1814); *Roem. et Schultes, Syst. Veg.* v, 485 (1819); *DC., Prodr.* ii, 36 (1825); *Linn., Syst. Veg.* ed. 16, i, 828 (1825); *D. Dietr., Syn. Pl.* i, 876 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 485 (1860) excl. var. omn.: ***P. rosmarinifolia***, *Willd., Enum. Hort. Berol.* 253 (1809): ***Soulangia axillaris***, *Brongn., Mem. Rham.* 71, tab. 6, fig. 3 (1826); *in Ann. Sc. Nat.* x, 378, tab. 17, fig. iii (1827); *Don, Gen. Syst.* ii, 42 (1832); *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 385 (1839).

A much branched shrub about 80 cm. high, with upper branches and branchlets clothed with grey, velvety pubescence. Leaves closely

set, 0·5—1·5 cm. long: lamina erect-spreading, linear or lanceolate-linear, subacute, apiculate, almost straight, with closely revolute margins entirely covering the lower surface or almost so; upper surface rounded, minutely tubercled on the sides and about the apex, otherwise smooth, at first pubescent on the tubercled portions and on the midrib, drying blackish: petiole about 1·5 mm. long. Flowers 2·5—3 mm. long, on pedicels 1·5—2 mm. long, laxly placed, in the axils of upper leaves and well below the termination of the branchlets. Bracts, as distinct from the leaves, and bracteoles absent. Calyx-tube about 0·75 mm. deep, broadly cyathiform, almost filled with a fleshy disc having a free outer margin, covered outside with subadpressed, grey pubescence. Sepals 1·25 mm. long, ovate, acute, flattened, slightly gibbous at the apex, covered outside with short, grey tomentum. Petals inserted at the mouth of the tube, 0·5 mm. long: lamina cucullate, orbicular: claw as long, cuneate. Ovary obconic, covered with subadpressed, grey pubescence. Style 0·5 mm. long, broadly conical. Stigma consisting of 3 short, erect lobes.

**South Africa: Cape Province**—KNYSNA DIV.: Keurbooms River at Postpad, alt. 20 feet, *Fourcade* 201.

**Var.  $\beta$ , microphylla** (*Pillans*): **P. microphylla**, *D. Dietr., Syn. Pl.* i, 876 (1839): **Soulangia microphylla**, *Ecklon et Zeyher, Enum.* 135 (1835)!: **Phylica villosa**, var. **squarrosa**, *Sond. in Harv. et Sond. Fl. Cap.* i, 486 (1860)!: plants 30—40 cm. high; leaves mostly 4—8 mm. long; lamina linear-lanceolate or linear, with revolute margins covering the lower surface, with the upper surface minutely tubercled all over: flowers 2·25—2·5 mm. long, on pedicels 1—1·5 mm. long, densely covered on the outer surface with white tomentum: petals as in the species but with the claw about half as long as the lamina: fruit about 6 mm. long, rotundate, sparsely puberulous or glabrous on the upper parts, dark brown, capped by a large calyx-area.

**South Africa:** without precise locality, *Masson, Drège* 6758.

**Cape Province**—GEORGE DIV.: Zwart River Hill, *Fourcade* 3888.—KNYSNA DIV.: sand hills at west end of Groene Vlei, *Burchell* 5658; Belvedere, *Duthie* 1204.—HUMANSDORP DIV.: north side of the Kromme River, near Wagenboom Station, *Burchell* 4840; Clarkson, *Schlechter* 6014; Humansdorp, *Burt-Davy* 11983; dune country at Slang River, *Fourcade* 2157; Groot Hoek, *Fourcade* 3521.—WILLOWMORE DIV.: Swanepoelspoort Berg, *Marloth* 4126.—UITENHAGE DIV.: Van Stadens, *Paterson* 2726.—PORT ELIZABETH DIV.: limestone hills between Coega and Sundays River, *Ecklon and Zeyher* 1040; Krakakamma, *Zeyher* 2222, *Ecklon and Zeyher* 1039; between Van Stadens and Bethelsdorp, *Drège* 6767; Port Elizabeth, *Cooper* 3511, *Salter* 372/8, in *Bolus Herb.*

19038, *L. Bolus in Bolus Herb.* 21991; Walmer, *Paterson* 2103; Vaal Vlei Estate, *Mogg* 4653, 4680; Thescomb, *L. Bolus in Bolus Herb.* 20141, 20142.

**Var.  $\gamma$ , *hirsuta*, Sond. in Harv. et Sond. Fl. Cap. i, 485, excl. syn. Thunb.:** *Soulangia hirsuta*, *Ecklon et Zeyher, Enum.* 136! excl. syn.: branchlets very villous; leaves mostly 8—10 mm. long; lamina lanceolate, closely and minutely tubercled over the upper surface: racemes congested, often capituliform: calyx-tube 0.75—1 mm. deep: petals with the claw about half as long as the lamina: style together with the stigma 1—1.25 mm. long.

**South Africa:** without precise locality, *Drège* 6768, *Niven in Bot. Mus. Stockholm.*

**Cape Province**—UITENHAGE DIV.: Van Stadens, *Ecklon and Zeyher* 1041, *Zeyher* 342, 2218, *Bolus* 1612.

**Var.  $\delta$ , *gracilis* (Pillans var. nov.):** plants about 60 cm. high: branchlets very slender: leaves 8—12 mm. long; lamina open-backed, with the upper surface smooth and glabrous except on the midrib, margins and at the apex: racemes very lax, overtopped by a considerable elongation of the branchlet: calyx villous: petals with the claw less than half as long as the lamina.

**South Africa: Cape Province**—PORT ELIZABETH DIV.: Loerie Plantation, *Dix* 231.

**Var.  $\epsilon$ , *lutescens* (Pillans):** *Soulangia lutescens*, *Ecklon et Zeyher, Enum.* 136!; *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 388 (1839): *Phylla lutescens*, *D. Dietr., Syn. Pl.* i, 876 (1839); *Sonder in Harv. et Sond. Fl. Cap. i*, 484: branchlets very many, crowded, slender: leaves about 5 mm. long; lamina minutely and closely tubercled over the upper surface: flowers very numerous, in short racemes at the ends of the branchlets, longer than the small, subtending leaves, densely covered with tomentum: calyx-tube 0.5 mm. deep: petals with the claw scarcely half as long as the lamina.

**South Africa:** without precise locality, *Drège* 6770, *Boivin.*

**Cape Province**—ALEXANDRIA DIV.: Zuurberg, *Zeyher* 2223, *Schönland* 3232, *Paterson* 50.—ALBANY DIV.: hills between Assegai Bush and Grahamstown, *Ecklon* 230, *Ecklon and Zeyher* 1043; hills near Grahamstown, *MacOwan* 63, *Bolus* 1942, *Schönland* 95, *Zeyher* 198, *Glass in Herb. Norm. Austr.-Afr.* 1420, *Guthrie* 3307, *Rogers* 3680, 27448; Howieson's Poort, *Galpin* 3099; Coldspring, *Britten* 2169; Southwell, *Britten* 2237.—STOCKENSTROOM DIV.: Katberg, rocky slopes near the Gorge, alt. 6,500 feet, *Dyer* 730.

**Var.  $\zeta$ , *Cooperi* (Pillans var. nov.):** branchlets slender, very numerous; leaves crowded, 7—10 mm. long, the lamina narrowly linear,

acute, semiterete, smooth and shiny on the upper surface, glabrous except for sparse pubescence on the median nerve and the margins, soon becoming glabrous, drying blackish, with closely revolute margins covering the lower surface; flowers as in var. *lutescens* but slightly smaller.

**South Africa: Cape Province**—ALBANY DIV.: without precise locality, *Cooper* 1546 (in *Bolus Herb.*).

**Var. *n*, pulchra** (*Pillans* var. nov.): branchlets very numerous and crowded in panicle-like clusters: leaves mostly 8—10 mm. long; lamina linear, with closely revolute margins, minutely and closely or sparsely tubercled, occasionally with a smooth strip on either side of the midrib: flowers very numerous, much surpassing the subtending leaves, in rather dense racemes at the ends of branchlets: pedicels up to 4 mm. long, the lower often bearing 1—3 bracteoles: petals with the claw occasionally almost as long as the lamina.

**South Africa: Cape Province**—KNYSNA DIV.: hills north of Ruigte Vlei, *Fourcade* 3910; side of main road between George and Knysna, *Pillans* 8359.—UNIONDALE DIV.: Long Kloof, *Pillans* 6667.—UITENHAGE DIV.: Van Stadens, *Ethel West* 306 (type).—BATHURST DIV.: between Rietfontein and Kowie River, *Burchell* 3987.—ALEXANDRIA DIV.: Alexandria, *Galpin in Bolus Herb.* 21963.

**Var.  $\theta$  maritima** (*Pillans* var. nov.): plants more compact than in the species or other varieties: stems rigid: leaves coarse, mostly 6—10 mm. long, usually closely set; lamina coarsely tubercled over the upper surface, lanceolate, with the revolute margins covering the lower surface or almost so, occasionally with a smooth strip on either side of the midrib: flowers in short, dense racemes at the ends of the branchlets, shortly pubescent: petals with the claw about half as long as the lamina.

**South Africa: Cape Province**—BREDASDORP DIV.: Wagenhuis Krans, *Fry in Galpin Herb.* 4955, *Jordaan in Stell. Univ. Herb.* 18925.—MOSSEL BAY DIV.: Mossel Bay, *Salter* 371/18.—RIVERSDALE DIV.: Still Bay, *Muir* 3121, 4445, 4633, 4634 (type), 4635, in *Bolus Herb.* 21992.—KNYSNA DIV.: Deep Walls, *J. Phillips* 6; dune country at Groot River, *Fourcade* 3693.

**Var.  $\iota$ , densifolia** (*Pillans* var. nov.): leaves very closely set, often imbricate, 4—7 mm. long, usually ascending; lamina linear or lanceolate, semiterete, very minutely tubercled or smooth and with short, adpressed, subsistent hairs: flowers in short, capituliform racemes: sepals shortly villous on the outer surface: petals with the claw scarcely half as long as the lamina.



**South Africa: Cape Province**—MOSSEL BAY DIV.: Mossel Bay, *Brother Moran in Bolus Herb.* 18667 (type), in *S. Afr. Mus. Herb.* 9102, *Salter* 371/1, 371/19.

The type of this species was grown in Paris; specimens taken from it are in Lamarek's and Sonder's herbaria. The typical form seems to be a shade-loving variation in a species having great variation in habit of growth, shape and surface of leaf-lamina and in the structure of the inflorescence. Throughout the varieties the floral characters are fairly uniform.

19. **P. pinea**, *Thunb., Diss. Phylica* 6 (1804)!; *ej. Fl. Cap.* 83 (1818); *Roem. et Schultes, Syst. Veg.* v, 481 (1819); *Thunb., Fl. Cap. ed. Schultes* 201 (1823); *DC., Prodr.* ii, 35 (1825); *Don, Gen. Syst.* ii, 41 (1832): **P. hirsuta**, *Thunb., Diss. Phylica* 6!; *ej. Fl. Cap.* 84; *Roem. et Schultes, Syst. Veg.* v, 482; *Thunb., Fl. Cap. ed. Schultes* 202; *DC., Prodr.* ii, 35: **P. reclinata**, *Wendl., Collect.* ii, 49, tab. 56 (1810); *Roem. et Schultes, Syst. Veg.* v, 485; *Linn., Syst. Veg. ed.* 16, i, 827 (1825); *DC., Prodr.* ii, 36; *D. Dietr., Syn. Pl.* i, 875 (1839): **Soulangia reclinata**, *Don, Gen. Syst.* ii, 42: **P. purpurea**, var. **reclinata**, *Sond. in Harv. et Sond. Fl. Cap.* i, 485 (1860): **P. axillaris**, var. **pedicellaris**, *Sond. l.c.*, var. **parvifolia**, *Sond. l.c.*

A much branched shrub, about 90 cm. high, rather stout in the lower parts, with the upper branches and branchlets tomentose and villous. Leaves closely set, mostly about 1.2 cm. long: lamina ascending or erect-spreading, straight or slightly incurved above the middle, lanceolate or linear-lanceolate, cordate at base, acute at apex, with revolute margins partly covering the lower surface; upper surface minutely and closely tuberculate-scabrid, villous, becoming glabrous: petiole about 1 mm. long. Racemes 0.5—2 cm. long, dense, usually hemisphaeric or rotundate, sometimes capituliform, terminal or rarely surpassed by vegetative growth. Pedicels 2—7 mm. long, in the axils of reduced leaves, covered with white tomentum, rarely with 1 or 2 bracteoles about the middle. Flowers 2.5—4 mm. long, distinctly constricted between the calyx and ovary, covered with white tomentum on the outer surface: calyx-tube about 0.5 mm. deep, broadly cyathiform, almost filled with a fleshy disc: sepals 1—1.5 mm. long, ovate or deltoid-ovate, acute, convex at the apex or with a raised median nerve. Petals 0.75—1 mm. long, inserted at the mouth of the tube and attached to the margin of the disc: lamina orbicular or reniform, cucullate: claw as long or longer, oblong or cuneate-oblong. Anthers 1-celled. Ovary turbinate. Style very short, conical. Stigma consisting of 3 minute rounded lobes. Fruit 6—7 mm. long, rotundate, with 3 longitudinal sulcae, puberulous, chestnut-brown, with a narrow calyx-base upon the summit.

**South Africa** : without precise locality, *Thunberg*, *Thom* 504, *Admiral Grey* in *Kew Herb.*, *Niven* in *Bot. Mus.*, *Stockholm*.

**Cape Province**—**PAARL DIV.** : Groot Drakenstein, *Rogers* 10509.—**SWELLENDAM DIV.** : Tradouw Pass, *Bolus* in *Herb. Norm. Austr.-Afr.* 1120, *Schlechter* 2078, *Bond* 208, *Marloth* 12168, *Levyms* 586, *Compton* 8577 ; mountain slopes near Swellendam, *Marloth* 3497 ; Barrydale mountains, *Barnard* in *S.A. Mus. Herb.* 29017.—**RIVERSDALE DIV.** : without precise locality, *Muir* 4473 ; Garcia's Pass, *Glover* in *Bolus Herb.* 15513, *L. Bolus* in *Bolus Herb.* 19618, *Phillips* 301, 329, *Smith* 2762.—**LADISMITH DIV.** : top of hill near Ladismith, *Levyms* 2731.—**MOSSEL BAY DIV.** : Attaquas Kloof, *Drège* 6757 ; Robinson's Pass, *Hutchinson* 3154 in *Bolus Herb.* 19030, *Taylor* in *Bolus Herb.* 18808, *Salter* 376/15, 376/16.—**GEORGE DIV.** : mountains near George, *Guthrie* 4287, *Bolus* 8639, *Rogers* 4306 ; Blanco, *Penther* 1920 ; Montagu Pass, *Schlechter* 5816, *Fourcade* 3247, 3846a ; Wilderness, *Levyms* 2412.—**KNYSNA DIV.** : "road between Cloete's Kraal and Paarde Kraal," *Burchell* 5152 ; Paardeberg, *Burchell* 5187 ; "Kaatje's Kraal," *Burchell* 5265 ; Plettenberg Bay, *Burchell* 5337, *Rogers* 26830, 28375 ; between Zout and Groote rivers, *Penther* 1921 ; valley of the Diep River, *Bolus* 2283 ; banks of Keurbooms River, *Fourcade* 1070, 1248a, *Schonland* 3452 ; Wilderness, *Compton* 10717, 10721 ; Groot River East, *Fourcade* 147a, 1237, 3684, 3695 ; Paardekop, *Fourcade* 3478, *Compton* 4605 ; Forest Hall, *Duthie* 731 ; Buffels Nek, *Fourcade* 3756 ; Olifants Berg, *Phillips* 155 ; Gouna Forest, *Keet* in *Forest Dept. Herb.* 2707 ; open grass country, seven miles east of Knysna, *Hutchinson* 1333 ; Keurboom River Heights, *Duthie* 753.—**HUMANSDORP DIV.** : Kareedouw, *Compton* 5148 ; Storms River, *Schlechter* 5964 ; Zitzikama, Lottering Bush, *Galpin* 3893 ; Blauwkrantz, *Compton* 7171.

20. **P. purpurea**, *Sond.* in *Hurv. et Sond. Fl. Cap.* i, 485 (1860)! excl. syn. Lodd. et var.  $\beta$ . : **Soulangia rubra**, *Lindl.* in *Bot. Reg.* tab. 1498 (1832) excl. syn. : **Phyllica rubra**, *Schnizlein*, *Iconogr.* iv, tab. 239, fig. 2 (1866-70) : **P. lanuginosa**, *Schniz.*, *l.c.* fig. 17.

A much branched plant up to 2 m. high, with ascending branches. Branchlets clothed with grey pubescence. Leaves usually closely set, 0.5—1 cm. long : the lamina erect-spreading or spreading, mostly more or less incurved, lanccolate, acute or obtuse, often apiculate, rounded or cordate at base, with revolute margins covering a half or more of the tomentose lower surface ; upper surface smooth and glabrous except for the finely tubercled and, at first, pubescent margins and median strip : petiole about 1 mm. long. Inflorescences dense, capituliform racemes, hemisphaerical or orbicular, 7—10 mm. wide, often aggregated in panicles. Bracts foliaceous, half as long to as long as the flowers.

Bracteoles absent. Pedicels 1—1.5 mm. long, covered with long, silky hairs. Flowers 3—4 mm. long, covered outside with long, usually spreading, silky and woolly, white hairs (those upon the ovary longest and straightest): tube about 0.5 mm. deep, broadly cyathiform, almost filled with a fleshy disc: sepals erect-spreading, 1.75—2 mm. long, ovate, flattened, gibbous or keeled at the apex, pink in life: petals inserted shortly below the sinuses, 0.5—1 mm. long; lamina cucullate, reniform-orbicular or orbicular; claw cuneate-oblong or cuneate, as long as or slightly longer than the lamina. Anthers 1-celled. Ovary turbinate. Style stout, about 0.5 mm. long, with a shortly lobed stigma. Fruit about 6 mm. long, rotundate, covered with spreading, silky, white hairs; with a convex, glabrous area occupying the summit of the fruit.

**South Africa: Cape Province**—BREDASDORP DIV.: hills near Bredasdorp, *L. Bolus in Bolus Herb.* 20557; south slopes of the Potberg, *Pillans* 9501.—RIVERSDALE DIV.: Oude Tuin, *Muir in Bolus Herb.* 21873; Botteliersfontein, *Muir* 1464.—MOSSEL BAY DIV.: near Reutersbosch, *Salter* 3247.—GEORGE DIV.: road between Trakadakow and west side of Kaaiman's Gat, *Burchell* 5777, 5781; Devil's Kop, *Niven* 29; between George and Swellendam, *Castlenau* 596; top of Zwart River Hill, *Fourcade* 3885; near George, *Hops in Bolus Herb.* 10043; banks of the Great Doorn River, *Thorne in S.A. Mus. Herb.* 51710.—KNYSNA DIV.: "road between Knysna Drift and Gouwkamma," *Burchell* 5564; Deep Wall, *Phillips* 5; Belvedere, *Duthie* 641, 1129; Concordia, *Kapp* 42; along Keurboom River, between Makamma River and Roman's Kraal, *Burchell* 5133; Keurboom River Heights, *Duthie* 753, *Fourcade* 3712; Phantom Pass, *Fourcade* 4136, *Hutchinson* 1308; the Crags, near Waterfall, *Fourcade* 3707; near the Wilderness, *Compton* 7557; Rabbits Island, near Deep Wall, *Fourcade* 3751; main road between George and Knysna, *Pillans* 8363; Goukamma Hill, *Fourcade* 3918.—UNIONDALE DIV.: Prince Alfred's Pass, *Fourcade* 3783, 3793.

**Var.  $\beta$ , floccosa** (*Pillans*, var. nov.); leaf-lamina with small, closely set tubercles over the entire upper surface, and with longer and more persistent hairs; flowers densely villous on the outer surface; fruit topped with a calyx-base scarcely enlarged in size beyond that of the flowering stage.

**Cape Province**—RIVERSDALE DIV.: Vet River, *Burchell* 6890, *Muir* 54, in *Galpin Herb.* 5177; Garcia's Pass, *Bolus* 11243, *Muir* 3289, 4527, *L. Bolus in Bolus Herb.* 21872 (type), *Levy's* 2730.—GEORGE DIV.: hills near George, *Schlechter* 2443.—KNYSNA DIV.: Storms River, *Laughton* 21874.—HUMANSDORP DIV.: flats at Ratel Bosch, *Fourcade* 31.

**Var.  $\gamma$ , Pearsonii** (*Pillans*, var. nov.); plants less robust; leaf-lamina shorter and narrower, usually semiterete, linear or subulate,

with the revolute margins covering the lower surface, with the upper surface closely tubercled or with a smooth strip up the middle; inflorescence 5—8 mm. wide, orbicular; bracteoles sometimes present; flowers 2.75—3 mm. long, densely covered outside with short, sometimes almost woolly hair; fruit 4—5 mm. long, surmounted by a wide calyx-base.

**Cape Province**—PRINCE ALBERT DIV.: Zwartberg Pass, north side near Prince Albert, *Bolus* 11749, *Pearson in Bolus Herb.* 15591 (type).—LADISMITH DIV.: near Ladismith, *Levyns* 2079; Roodeberg, *Levyns in Bot. Dept., Univ. Cape Town* 6063; Van Wyk's Pass, *Kington in Bolus Herb.* 21995; Muiskraal, *Galpin* 3889, *Levyns* 2115.—UNIONDALE DIV.: Uniondale, *Paterson* 3044.

21. ***P. confusa***, sp. nov. Frutex ramosissimus; ramulis pubescentibus dense foliatis; foliis linearibus vel lanceolatis obtusis vel acutis basi cordatis minute tuberculatis, marginibus arte revolutis; capitulis hemisphaericis in paniculis dispositis; bracteis ovatis vel oblongis pubescentibus; floribus sessilibus extus niveo-tomentosis; tubo late cyathiformi; sepalis deltoideo-ovatis supra medium convexis; petalis sub sinibus calycis insertis, lamina orbiculari cucullata, ungue brevissimi; ovario obconico; stylo brevi subulato.

A much branched shrub, about 60 cm. high, with wiry, often virgate, ascending branches. Branchlets slender, villous and clothed with short, grey pubescence. Leaves closely set, 0.5—1.5 cm. long: lamina erect-spreading or spreading, somewhat incurved, linear or lanceolate, obtuse or acute, cordate at base, semiterete and with closely revolute margins covering the lower surface or the lower surface much exposed; upper surface minutely tubercled, at first pubescent, soon becoming glabrous: petiole about 1 mm. long. Capitula mostly on short branchlets and associated in paniculate clusters, 3—5 mm. wide, hemisphaeric, surrounded by several leaves and outer foliaceous bracts. Bracts of the inner flowers about 2 mm. long, ovate or oblong, acute, silky-pubescent. Bracteoles 2, shorter, linear-lanceolate. Flowers sessile, 2.25—2.5 mm. long, entirely covered on the outer surface with white tomentum: calyx-tube very widely cyathiform, filled with a fleshy disc: sepals 0.75 mm. long, deltoid-ovate, acute, keeled on the upper half of the inner surface. Petals inserted at the mouth of the tube and shortly adnate to the margin of the disc: lamina orbicular, deeply concave, cucullate: claw very short and narrow. Anthers 1-celled. Ovary obconic. Style together with the stigma about 0.5 mm. long, subulate, obtuse. Fruit 5—6 mm. long, obovate-rotundate, glabrous, blackish, with 3 longitudinal furrows, surmounted by a small calyx-base.

**South Africa: Cape Province**—UNIONDALE DIV.: Formosa, *Compton* 4237, 4265; Many Waters Kloof, *Compton* 5144; Helpmekeer Peak,

*Esterhuysen* 4626.—HUMANSDORP DIV.: Witte Els Bosch, *Fourcade* 1162 (type, in Bolus Herb.), 2199; Clarkson, *Fourcade* 4040; Kareedouw, *Compton* 5147.—UITENHAGE DIV.: Uitenhage, collector unknown, specimen in S.A. Mus. Herb.

The smaller, sessile flowers with different petals distinguish this species from *P. purpurea*, Sond. to which it is most nearly related.

22. ***P. variabilis***, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis pubescentibus dense foliatis; foliis lanceolatis vel ovato-lanceolatis apiculatis basi late rotundatis supra minute tuberculato-scabridis marginibus revolutis; capitulis hemisphaericis; bracteis linearibus villosis; floribus stipitatis; tubo late cyathiformi glabro; disco sensim carnosus; sepalis ovatis acutis intus infra medium planis gibbosis; petalis sub sinibus calycis insertis, lamina orbiculata cucullata, ungue subaequilongo cuneato; ovario anguste obconico glabro; stylo brevi; stigmatibus pulvinatis.

A much branched, dense shrub about 60 cm. high, rigid in its lower parts, with ascending branches. Branchlets slender, densely pubescent with spreading hairs. Leaves crowded, 0.7—1.2 cm. long: lamina erect-spreading, lanceolate or ovate-lanceolate, apiculate, widely rounded at base, with revolute margins covering about half or less of the lower surface; upper surface minutely tuberculate-scabrid and at first villous on the margins and midrib, elsewhere smooth and glabrous; lower surface white-tomentose, frequently with evident lateral nerves: petiole 1.5—2 mm. long. Capitula solitary or clustered, 0.5—1 cm. wide, hemisphaeric, surrounded at base by a few leaves and leafy bracts. Bracts of the inner flowers about 2 mm. long, linear, villous. Bracteoles 2, acicular, villous. Flowers stipitate, 2.5—3 mm. long: calyx-tube scarcely 0.5 mm. long, widely cyathiform, glabrous, with a conspicuous, fleshy disc having its upper margin free: sepals 1—1.25 mm. long, ovate, acute, villous on the outer surface; inner surface flattened in the lower half except for a small keel, gibbous at the apex. Petals inserted at the mouth of the tube and attached to the margin of the disc: lamina orbicular, cucullate: claw about as long, cuneate. Anthers reniform, 1-celled. Ovary narrowly obconic, glabrous. Style together with the depressed stigma 0.5 mm. long.

**South Africa: Cape Province**—CALEDON DIV.: Somerset Sheewkopp, *Stokoe* 2841 (type, in Bolus Herb.); west slopes of Landdrost Kop, *Stokoe* 2839.

Floral characters indicate affinity of this species with *P. purpurea*, Sond. from which it differs by having stipitate flowers and a glabrous calyx-tube and ovary.

23. *P. elimensis*, sp. nov. Frutex ramosissimus circiter 60 cm. altus ramulis cano-pubescentibus; foliis anguste linearibus subacutis basi rotundatis minute tuberculatis, marginibus arte revolutis; floribus axillaribus pedicellatis extus retrorse pubescentibus; tubo cyathiformi; sepalis late ovatis; petalis tubo medio insertis, lamina rotundata cucullata, ungue brevissimi cuneato; ovario obconico; stigmatibus sessilibus.

A much branched shrub, about 60 cm. high, with ascending, wiry branches. Branchlets slender, clothed with adpressed, grey pubescence. Leaves closely set, 0.5—1.2 cm. long: lamina narrowly linear, sub-acute or obtuse, rounded at base, semiterete, ascending or erect-spreading, with closely revolute margins covering the lower surface; upper surface closely and minutely tubercled, at first adpressedly pubescent: petiole about 1 mm. long. Inflorescence about 1 cm. long. Flowers 2—2.5 mm. long, on pubescent pedicels 1—2 mm. long, in the axils of the upper leaves, densely covered on the outer surface with retrorse, grey pubescence: calyx-tube cyathiform, filled with a fleshy disc: sepals 1 mm. long, widely ovate, acute, gibbous at the apex. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina rotundate, deeply concave, cucullate: claw scarcely a quarter as long, cuneate. Anthers reniform, 1-celled. Ovary obconic. Style very short. Stigma minute. Fruit pedicellate, about 3 mm. long, rotundate, truncate above, retrorse-pubescent, with a large calyx-base on the summit.

**South Africa: Cape Province**—BREDASDORP DIV.: near Elim, *Bolus in Bolus Herb.* 19039 (type).—RIVERSDALE DIV.: near Zoetmelks River, *Burchell* 6638; Zoetmelks Fontein, 600 ft., *Muir* 472.

In most characters this species is closely allied to *P. axillaris*, Lam. var. *microphylla* (*Pillans*) but differs in having retrorse hairs on the flowers.

24. *P. cryptandroides*, *Sond. in Harv. et Sond. Fl. Cap.* i, 484 (1860)!; *Mueller in Walpers Ann. Bot. Syst.* vii, 593 (1869): **Soulangia subcanescens**, *Presl, Bot. Bemerk.* 38 (1844) absque descr.

A shrub, often up to 3 m. in height, with many virgate branches. Branchlets wiry, thinly covered with adpressed, grey pubescence. Leaves closely set, 1—1.5 cm. long: lamina linear-subulate, mucronate, rounded at base, mostly curved, with closely revolute margins covering the lower surface; upper surface rounded, minutely tuberculate-scabrid, at first silky pubescent, becoming glabrous: petiole 1.5—2 cm. long. Inflorescences are few-flowered capituliform racemes, always assembled in panicles sometimes so small and congested as to appear to be capitula. Panicles 0.8—3 cm. wide. Racemes with tomentose stalks. Bracts caducous, lanceolate, tomentose, shorter than the flowers. Bractcoles absent. Pedicels 0.75—2 mm. long, tomentose. Flowers

1.5—2 mm. long, covered outside with white tomentum, glabrous within: calyx-tube 0.5 mm. deep, broadly cyathiform, lined up to the mouth with a fleshy disc: sepals 1 mm. long, deltoid-ovate, acute, flattened, gibbous at the apex, with the midrib slightly prominent on the upper half. Petals inserted at the mouth of the tube, 0.5 mm. long: limb orbicular, cucullate: claw less than half as long, oblong. Anthers 1-celled. Ovary obconic. Style short, stout, with 3 small stigmatic lobes. Fruit about 6 mm. long, rotundate, thinly tomentose, with a broad convex area occupying the summit.

**South Africa:** without precise locality; *Masson, Niven* 25.

**Cape Province**—PIQUETBERG DIV.: "high sandy plains, Piquetberg," *Niven* 20; the Piquetberg, *Edwards in Bolus Herb.* 18694.—CLANWILLIAM DIV.: mountains at Heerenlogement, *Zeyher, Compton* 10957; Pakhuis Pass, *MacOwan* 3253, in *Herb. Austr.-Afr.* 1824, Penfold 219, *Leipoldt in Bolus Herb.* 18668, *Compton* 4333, 4742, 6869, 7741, 9538; Cedarberg, *Diels* 877, *Marloth* 2667; mountains near Wupperthal, *Bolus* 8961b; Blauwberg, *Schlechter* 8435; Olifants River Valley, *Dickson in Bolus Herb.* 5610; plateau on the summit of Nardouw Mountains, *Pearson in Sladen Mem. Exped.* 5419; Grey's Pass, *Schlechter* 4962, 7491; Kardouw Mountains, *Zeyher* 323; Uitkyk Pass, *Compton* 5055.—VAN RHYNSDORP DIV.: Giftberg, *Phillips in Sladen Mem. Exped.* 7349, 7350; Snorkfontein, *Compton* 7226.—NAMAQUALAND: Roodeberg, on the Khamiesberg, *Drège* (? 1916); Wilgehout Ravine, on the Khamiesberg (5,300 feet alt.), *Pearson in Sladen Mem. Exped.* 6350; Khamiesberg, near Garies, *Markotter in Stell. Univ. Herb.* 19494.

25. *P. rigidifolia*, *Sond. in Harv. et Sond. Fl. Cap. i*, 484 (1860)!

A much branched shrub, about 60 cm. high, with ascending, wiry branches. Branchlets slender, clothed with short, white, adpressed pubescence. Leaves usually closely set, 1.2—2.5 cm. long: lamina ascending or erect-spreading, linear or subulate, semiterete, mucronulate, rounded at base, with closely revolute margins covering the lower surface; upper surface entirely, and closely tubercled, at first clothed with adpressed, grey hairs: petiole 2—3 mm. long. Inflorescence a dense, ovate or rounded panicle, about 1.5 cm. long, up to 2.5 cm., less often a simple raceme. Pedicels 2—4 mm. long, tomentose; the lower sometimes with bracteoles about the middle. Bracts oblong-lanceolate, tomentose on the lower surface, shorter than the pedicels. Flowers 2.5—3.75 mm. long, with a dense covering of white tomentum on the outer surface: calyx-tube 0.5—1 mm. deep, campanulate, lined with a rather fleshy disc: sepals 1—1.5 mm. long, deltoid-ovate, acute, gibbous at the apex, with a slightly raised midrib. Petals inserted at the mouth of the tube, 0.75—1 mm. long: lamina orbicular, cucullate: claw less

than half as long, oblong or cuneate. Anthers 1-celled. Ovary obconic. Style together with the stigma 0·75—1·5 mm. high, narrowly conical, cylindrical or subulate. Fruit about 8 mm. long, rotundate, glabrous, blackish, with a wide area covered by the base of the calyx.

**South Africa: Cape Province**—PIQUETBERG DIV.: Piquetberg, *Niven* 20.—TULBAGH DIV.: without precise locality, *Berg in Berlin Herb.*—CERES DIV.: Zwart Ruggens, *Marloth* 3284, *Levy's* 1800; Karoo Poort, *Levy's* 1517, *Hutchinson* 434, *Compton* 5561.—WORCESTER DIV.: Hex River Mountains, *Drège* 1627, in *Berlin Herb.* 591; near Touws River, *Levy's* 866.—SWELLENDAAM DIV.: Tradouw Pass, Stokoe in *Bolus Herb.* 21330.—LAINGSBURG DIV.: Constable, *Drège* 6771; Tweedside, *Levy's* 2367, *Compton* 3041.—PRINCE ALBERT DIV.: Kendo, *Drège* 6772.—VAN RHYNSDORP DIV.: Gift Berg, *Phillips in Sladen Mem. Exped.* 7350.—CALVINIA DIV.: Nieuwoudtville, *Leipoldt in Bolus Herb.* 9365; Oorlogs Kloof, *Lavis in Bolus Herb.* 19522.—CLANWILLIAM DIV.: Uitkomst, *Zeyher* 324; Krakadouw, *Leipoldt* 564; Koudeberg, *Schlechter* 8344; banks of Olifants River, *Schlechter* 5011; Clanwilliam, *Mader* 189; Cedarberg, *Pattison in Bolus Herb.* 13924; Wupperthal, *Bolus* 8961; Long Kloof, *Shaw in Bolus Herb.* 5611; Lamms Kraal, *Diels* 772; Boontjes River, *Compton* 4306; Kromme River, *Compton* 5054; Nardouw Pass, *Pillans* 7096.—NAMAQUALAND: Vogel Klip, in the Khamiesberg, *Pearson in Sladen Mem. Exped.* 5919.

26. *P. ambigua*, *Sond. in Harv. et Sond. Fl. Cap.* i, 486 (1860)! : *Soulangia plumosa*, *Presl, Bot. Bemerk.* 38 (1844) *absque descr.*

A much branched shrub, about 60 cm. high, rather rigid in the lower parts. Branchlets slender, covered with short, grey pubescence. Leaves closely set, mostly 1—1·5 cm. long; lamina erect-spreading or ascending, acicular, acute or obtuse, with closely revolute margins covering the lower surface; upper surface finely tubercled, at first silky pubescent, at length glabrous; petiole about 1 mm. long. Flowers about 2·5 mm. long, clothed on the outside with soft white pubescence, on pedicels 0·75—1 mm. long, in the axils of the upper leaves and assembled in dense, oblong or elliptic racemes mostly 1·5—2 cm. long which are surmounted by the leafy extension of the branchlets. Calyx-tube 0·75 mm. deep, campanulate, with a corona-like, toothed disc at the base 0·25—0·5 mm. high; sepals 1 mm. long, deltoid-ovate, acute; upper surface with a short, prominent ridge from the apex downwards. Petals inserted at the mouth of the tube, 0·5 mm. long; lamina orbicular-cordate, cucullate; claw very short, linear-cuneate. Anthers 1-celled. Ovary obconic. Style columnar, 1—1·5 mm. long. Stigma narrowed, shortly 3-lobed. Fruit 6—7 mm. long, obovate-rotundate, puberulous or subglabrous, with a moderate, almost flattened area on the summit.



**South Africa: Cape Province**—CLANWILLIAM DIV.: Blauwberg, *Drège* 1914; Cedarberg, Groenberg, *Diels* 881; Pakhuis Pass, *Leipoldt* in *Bolus Herb.* 18690, *Compton* 9614, *Salter* 2774, *Bond* 583; Warm Baths, *Edwards* in *Bolus Herb.* 13335, 13740; Elands Kloof, *Lewis* in *Bolus Herb.* 21957, *Compton* 6526; Schimmelberg, *Pillans* 9119.—**CERES** DIV.: De Straat, *Compton* 6525.

27. ***P. villosa***, *Thunb.*, *Prodr. Cap.* 44 (1794)!; *Willd.*, *Sp. Pl.* i, 1109 (1798); *Thunb.*, *Diss. Phylica* 6 (1804); *Poir.* in *Lam. Encycl. Bot.* v, 294 (1804); *Pers.*, *Syn. Pl.* i, 245 (1805); *Ait.*, *Hort. Kew.* ed. 2, ii, 20 (1811); *Thunb.*, *Fl. Cap.* 38 (1818); *Roem. et Schultes*, *Syst. Veg.* v, 481 (1819); *Thunb.*, *Fl. Cap.* ed 2, p. 202 (1823); *DC.*, *Prodr.* ii, 35 (1825); *Linn.*, *Syst. Veg.* ed. 16, i, 828 (1825); *Don*, *Gen. Syst.* ii, 41 (1832); *Dietr.*, *Syn. Pl.* i, 876 (1839); *Sond.* in *Harv. et Sond. Fl. Cap.* i, 485 (1860) incl. var.  $\beta$ .: ***Soulangia pinea***, *Ecklon et Zeyher*, *Enum.* 136 (1835) absque descr.

A much branched shrub, about 1 m. high, with ascending, sometimes virgate, wiry branches. Branchlets slender, clothed with short, adpressed, grey pubescence. Leaves closely set, mostly 7—10 mm. long, rarely up to 20 mm.: lamina narrowly linear, acute or attenuate, rounded at base, erect-spreading, sometimes secund and curved, with closely revolute margins covering the lower surface; upper surface minutely tubercled, clothed with adpressed, grey pubescence, ultimately glabrous or nearly so: petiole 1—1.5 mm. long. Racemes rotundate, conical or oblong, mostly dense, occasionally lax, 1—2.5 cm. long. Bracts foliaceous, 4—5.5 mm. long, the lower half often consisting of the lengthened petiole. Bracteoles absent. Pedicels 2—2.5 mm. long, shortly pubescent. Flowers 2 mm. long, clothed on the outer surface with short, adpressed, grey hairs except at the apices of the sepals where the hairs are tufted, longer and spreading: calyx-tube 0.5 mm. deep, broadly cyathiform, almost filled with a pentagonal, fleshy disc: sepals deltoid-ovate, acute, about 1 mm. long, with a prominent keel down the upper half. Petals inserted at the mouth of the tube, 0.5 mm. long or slightly longer: lamina rotundate, concave, shortly cucullate at the apex: claw about half as long, cuneate-oblong. Anthers 1-celled. Ovary broadly obovate. Style 0.5 mm. high, conical. Stigma composed of 3 rounded lobes. Fruit about 8 mm. long, rotundate, puberulous or almost glabrous at maturity, chestnut-brown, with a wide, slightly convex calyx-area occupying the summit.

**South Africa:** without precise locality, *Masson*, *Drège* 1914, *Mund* in *Kew Herb.*

**Cape Province**—PIQUETBERG DIV.: Piquetberg, *Thunberg*, *Bodkin* in *Bolus Herb.* 7541, in *Guthrie Herb.* 2564, *Schlechter* 5202, 7909; Kromme

River, *Zeyher*; top of Versveld's Pass, *Pillans* 7164, hills north-west of Mouton's Vlei, *Pillans* 7325.—CLANWILLIAM DIV.: Brakfontein, *Ecklon and Zeyher* 1042; Koudeberg, *Schlechter* 8744; Olifants River mountains, *Schlechter* 5118, *Mader in MacOwan Herb.* 2170; near Wupperthal, *Leipoldt* 498; Grey's Pass, *Pillans* 6309, in *Bolus Herb.* 18695, *Barker* 745; Warm Baths, *Stephens in Sladen Mem. Exped.* 7222, 7224, 7228, *Edwards* 81, *Compton* 5315; Kromme River in the Cedarberg, *Compton* 4963; Waboom River Mts., *Compton* 6520.

**Var.  $\beta$ , pedicellata** (*Sond. in Harv. et Sond. Fl. Cap.* i, 486): **P. pedicellata**, *DC.*, *Prodr.* ii, 36 (1825)!: **Soulangia pedicellata**, *G. Don*, *Gen. Syst.* ii, 42 (1832); *Presl, Bot. Bemerk.* 38 (1844) absque descr.; leaves usually longer, usually about 2 cm.; pedicels 2.4—8 mm. long; flowers 3 mm. long, with a dense covering of longer, woolly and silky hairs; petals 0.75—1 mm. long, with an orbicular lamina; style with a slight enlargement at the middle; fruit often larger.

**South Africa**: without precise locality, *Niven* 19.

**Cape Province**—CLANWILLIAM DIV.: between Langvlei and Olifants River, *Drège* 1913; Clanwilliam, *Mader*, 194, *Rogers* 16828; Algeria, *Levyns* 2196, *Stokoe in Bolus Herb.* 21871; Cedarberg, *Stokoe in Marloth Herb.* 10581, *Wilson* 91; Groenberg, *Diels* 876; Uitkyk Pass, *Compton* 4805, 5363; Pakhuis Pass, *Esterhuysen* 3216; Grootberg, *Esterhuysen* 4155; Middelberg, on the Cedarberg, *Compton* 6213.

28. **P. recurvifolia**, *Ecklon et Zeyher, Enum.* 135 (1835)!: *D. Dietr.*, *Syn. Pl.* i, 876 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 488 (1860).

A moderately branched shrub, about 40 cm. high. Branches usually virgate. Branchlets slender, clothed with grey pubescence. Leaves 1.2—1.7 cm. long: lamina linear, attenuate, rounded at base, erect-spreading, somewhat recurved, with closely revolute margins almost covering the lower surface; upper surface minutely scabrid, at first covered with silky pubescence: petiole about 2 mm. long. Inflorescence a lax spike about 2 cm. long. Bracts leaf-like, about 6 mm. long, linear, with revolute margins, pubescent on both sides except on the basal part of the upper surface. Bracteoles 2, similar but slightly shorter. Flowers 3 mm. long, with a dense covering of silky, white hairs on the outside, glabrous within: calyx-tube 1.5 mm. deep, campanulate: sepals 1 mm. long, ovate-deltoid, acute, with a prominent midrib on the inner surface. Petals inserted at the mouth of the tube, 0.75 mm. long: lamina rotundate, deeply concave, with incurved margins: claw very short. Anthers 1-celled. Ovary broadly obconic. Style 1 mm. long, trigonous, slender, narrowed into an entire stigma. Fruit rotundate, tapered at base, about 5 mm. long, subtrilobed, sparsely pilose or glabrous, chestnut-brown, with a small depressed area on the summit.

**South Africa: Cape Province**—SWELLENDAM DIV.: mountains above Puspas Vlei, *Ecklon and Zeyher* 1033.

29. ***P. Schlechteri***, sp. nov. Fruticulus paulum ramosus; ramulis pubescentibus dense foliatis; foliis linearibus obtusis vel apiculatis basi rotundatis paulum tuberculatis, marginibus arte revolutis; capitulis hemisphaericis paucifloris; bracteis linearibus sparse pubescentibus; floribus stipitatis; tubo campanulato extus pilis caducis obtecto, disco conspicuo; sepalis deltoideo-ovatis paulum convexis extus pubescentibus; petalis sub sinubus calycis insertis, lamina elliptica obtusa concava, ungue minuto; ovario turbinato.

A low, sparingly branched shrub with ascending wiry branches. Branchlets closely covered with short, spreading, buff-coloured hair. Leaves closely set, 8–10 mm. long: lamina linear, obtuse or apiculate, rounded at base, semiterete, erect-spreading, slightly incurved, with closely revolute margins covering the lower surface; upper surface with scattered tubercles, at first pilose with buff-coloured hairs, becoming glabrous: petiole 1–1.5 mm. long. Capitula 5–7 mm. wide, usually in clusters of 2 or 3, hemisphaeric, few-flowered, subtended by several or many leaves. Bracts of the outer flowers 3–4 mm. long, lanceolate, dorsally covered with buff-coloured hairs: bracts of the inner flowers linear, sparsely pubescent except at the apex. Bracteoles absent. Flowers 1.75–2.75 mm. long, stipitate: calyx-tube about 1 mm. deep, campanulate, covered outside with long, caducous, ascending, buff-coloured hairs, with a conspicuous disc lining the inside: sepals 0.5–0.75 mm. long, deltoid-ovate, acute, slightly convex on the inner surface, with ascending, buff-coloured pubescence on the outer surface. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina elliptic, obtuse, concave on the inner side: claw minute. Anthers rotundate-reniform, 1-celled. Ovary turbinate, covered with caducous hairs as on the tube. Style together with the stigma scarcely 0.75 mm. long, cylindrical.

**South Africa: Cape Province**—CAPE DIV.: among rocks on Table Mountain, above Orange Kloof, *Schlechter* 931 (in Bolus Herb.).

30. ***P. lanata***, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis cano-tomentosis dense foliatis; foliis lanceolatis obtusis vel apiculatis basi subcordatis supra minute tuberculatis, marginibus arte revolutis; capitulis paucifloris; bracteis oblongis utrinque villosis, supra medium foliaceis; floribus subsessilibus extus cano-tomentosis; tubo late cyathiformi; sepalis deltoideo-ovatis supra medium carinatis; petalis sub sinubus calycis insertis, lamina rotundata-cordata cucullata, ungue subaequilongo cuneato; ovario obconico; stylo brevissimi.

A much branched shrub, about 60 cm. high, rigid at base, with wiry branches. Branchlets slender, clothed with short, grey tomentum. Leaves closely set, 4—6 mm. long : lamina erect-spreading or ascending, slightly incurved, lanceolate, obtuse or apiculate, subcordate at base, with closely revolute margins covering the lower surface ; upper surface minutely and closely tubercled, at first pubescent : petiole very short. Capitula solitary or clustered, 5—8 mm. wide, orbicular or hemisphaeric, few-flowered, subtended by several leaves. Bracts of the inner flowers about 3 mm. long, oblong, foliaceous in the upper half, villous on both sides. Bracteoles 2, sometimes absent, linear, entirely villous. Flowers 2.5—2.75 mm. long, on a very short, silky-villous stipe, with a dense covering of white, woolly hair on the outside : calyx-tube about 0.5 mm. deep, broadly cyathiform, lined with a rather conspicuous, fleshy disc : sepals about 1 mm. long, deltoid-ovate, acute, keeled down the upper half. Petals inserted at the mouth of the tube, scarcely 0.75 mm. long : lamina rotundate-cordate, cucullate : claw almost as long, cuneate. Anthers reniform, 1-celled. Ovary obconic. Style very short, broadly conical. Stigma composed of 3 rounded lobes, scarcely reaching up to the bases of the petals. Fruit about 5 mm. long, rotundate, sparsely tomentose, with a small calyx-base on the summit.

**South Africa : Cape Province**—LAINGSBURG DIV. : Witteberg, 3,500-5,000 ft., *Compton* 2590, 2650, 2979, 2986 (type, in Bolus Herb.), 3047, 5920, 6594, 10811 ; “Stelladale,” *Göldner in Stell. Univ. Herb.* 10, 114.—PRINCE ALBERT DIV. : on the Zwartberg, near Zwartberg Pass, *Marloth in Bolus Herb.* 18693, *Compton* 7169 ; Seven Weeks Poort, *Phillips* 1420, *Compton* 8610.—LADISMITH DIV. : Amalienstein, *Herre in Stell. Univ. Herb.* 15895 ; Touws Berg, *Levyms* 6149 ; Roodeberg, *Compton* 8682.

The affinity of this species is with *P. lasiocarpa*, Sond. from which it is distinguished by the leaf-lamina being tubercled over the entire upper surface, by subsessile flowers and by the claw of the petals being almost as long as the lamina.

31. **P. obtusifolia**, sp. nov. Frutex ramosissimus circiter 35 cm. altus ; ramulis gracilibus tomentosis dense foliatis ; foliis oblongis obtusissimis basi cordatis supra tuberculato-scabridis apice primum pilosis, marginibus arte revolutis ; capitulis singulis hemisphaericis paucifloris ; bracteis anguste spatulatis extus villosis ; floribus stipitatis ; tubo cyathiformi extus tomentoso ; sepalis deltoideo-ovatis planis extus tomentosis ; petalis deficientibus ; staminibus tubo medio insertis ; ovario obconico villosa ; stylo brevi ; stigmatibus trilobatis.

A much branched, dense shrub, about 35 cm. high, with ascending, wiry branches. Branchlets slender, well covered with grey tomentum.

Leaves closely set, about 4 mm. long, erect-spreading: lamina oblong, very obtuse, cordate and often slightly widened at base, subterete, closely revolute at the margins, with the lower surface covered; the entire upper surface closely tuberculate-scabrid, at first tomentose, pilose at the apex, soon becoming glabrous: petiole very short, mostly hidden by the base of the lamina. Capitula solitary, about 4 mm. wide, hemisphaeric, comparatively few-flowered, surrounded by several sterile bracts with foliaceous tips. Bracts of the inner flowers narrowly spatulate, about 1.25 mm. long, dorsally villous. Bracteoles 2, narrowly linear, dorsally villous. Flowers stipitate, about 2.5 mm. long: calyx-tube 0.75 mm. deep, cyathiform, clothed with deciduous tomentum: sepals 0.75 mm. long, deltoid-ovate, with a dense covering of grey tomentum on the outer surface, flattened and glabrous on the inner. Petals absent. Stamens inserted half way up the tube: anthers reniform, 1-celled. Ovary obconic, villous with persistent grey hairs. Style short and stout. Stigma 3-lobed. Fruit about 5 mm. long, obovate, densely villous, surmounted by a small calyx-area.

**South Africa: Cape Province**—CERES DIV.: Baviaansberg, *Stokoe* 6100 (type, in Bolus Herb.); Cold Bokkeveld Tafelberg, *Esterhuysen* 3885, *Compton* 10074. This species has affinity with *P. retrorsa*, E. Mey. from which it is easily distinguished by a much longer, oblong leaf-lamina, by broader sepals and by the persistently villous ovary.

32. *P. chionophila*, *Schltr. in Journ. Bot.* xxxv, 428 (1897)!

A much branched shrub about 40 cm. high. Branchlets wiry, covered with silky, grey pubescence. Leaves crowded, 1—1.5 cm. long: lamina linear, obtuse or subacute, narrowed or rounded at base, with closely revolute margins covering the lower surface, very slightly incurved; upper surface rounded, minutely tuberculate-scabrid, at first silky villous, soon becoming glabrous. Capitula 1—1.2 cm. wide, hemisphaeric, slightly flattened above, surrounded by a few shorter villous leaves and foliaceous bracts. Bracts of the inner flowers 4.5—6 mm. long, oblong-ob lanceolate or elliptic-oblong, acute, navicular, silky villous on the outer surface. Bracteoles 2, about 4.5 mm. long, linear, dorsally villous. Flowers stipitate, 3.5—5 mm. long, slightly compressed laterally, considerably overtopped by the long, woolly hairs of the sepals: calyx-tube 1 mm. deep, cyathiform, covered outside with long, ascending, silky, white hairs: sepals 1.5—1.75 mm. long, ovate, obtuse; inner surface slightly concave, gibbous at the apex, glabrous; outer surface covered by a dense mass of white, woolly hair. Petals at the mouth of the tube, 1 mm. long: lamina rotundate or ovate, obtuse, cucullate: claw about half as long, linear. Anthers 1-celled. Ovary narrowly obconic, covered with long, silky hairs. Style about 0.5 mm.

long, stout. Stigma capitate. Fruit 6—7 mm. long, rotundate, with a large convex, glabrous area upon the summit, wrinkled, purple-brown, thinly silky pubescent and puberulous.

**South Africa: Cape Province**—CERES DIV.: Mostert's Hoek, *Alfred Bolus in Guthrie Herb.* 3379, *Marloth* 1987 (alt. 5,700 feet); mountains near Ceres, *Bolus* 8366; mountain range between Mostert's Hoek Twins and Waarbosch, *Stokoe* in *Bolus Herb.* 21956.—WORCESTER DIV.: Brandwacht Mt., 5,000 ft., *Stokoe* 1954; Zeebasberg, *Stokoe in Bolus Herb.* 22434.

33. **P. lasiocarpa**, *Sond. in Harv. et Sond. Fl. Cap.* i, 483 (1860)! incl. vars.; *Mueller in Walp. Ann. Bot. Syst.* vii, 592 (1869); **P. lanceolata**, *Ecklon et Zeyher, Enum.* 132 (1835)! non Thunb.: *Soulangia ledifolia*, *E. et Z. op cit.* 136!.

A much branched shrub, up to 60 cm. high, with wiry branches. Branchlets slender, clothed with short cream-coloured or grey pubescence. Leaves mostly 6—12 mm. long: lamina erect-spreading, linear, lanceolate-linear or linear-oblong, subacute or obtuse, apiculate, rounded at base, with revolute margins covering most or, in luxuriant growth, less than half of the lower surface; upper surface with minute tubercles on the margins, on the midrib and about the apex, or quite smooth, at first villous upon the tubercled parts, soon becoming glabrous: petiole 1—1.5 mm. long. Capitula normally solitary, 5—6 mm. wide, flattened above, subtended by several reduced leaves. Bracts about 2 mm. long, lanceolate, densely villous. Bracteoles absent. Flowers sessile, 2—2.5 mm. long, covered outside with white tomentum: calyx-tube broadly cyathiform, almost filled with a fleshy disc: sepals 1 mm. long, deltoid-ovate, acute; inner surface flattened, with a slight keel up the middle. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina orbicular, cucullate: claw half as long, cuneate. Anthers 1-celled. Ovary broadly obconic. Style with stigma 0.5 mm. long, narrowly conical. Fruit about 7 mm. long, obovate-rotundate, densely tomentose, dull green, with a narrow base of the calyx-tube upon the summit.

**South Africa: Cape Province**—STELLENBOSCH DIV.: Sir Lowry's Pass, *Ecklon and Zeyher* 1012, *Bolus* 7320; Gordon's Bay, *Markotter in Stell. Univ. Herb.* 8724.—CALEDON DIV.: Donkerhoek Berg, *Burchell* 7948; Hottentots Holland mountains, *Ecklon and Zeyher* 1044; near Klein River, *Zeyher* 2221; near Caledon, *Bolus* 18691; Hemel en Aarde, *Schlechter* 10380; Houwhoek, *Schlechter* 7380; Kleinmond, *Gillett* 605, *Stokoe* 2693; Onrust, *Compton* 3374; west base of Buffels Mt., *Pillans* 8265; Hangklip, *Pillans* 8306.—BREDASDORP DIV.: Elim, *Schlechter* 7653, *Bolus in Bolus Herb.* 19040, in *Guthrie Herb.* 3856.

34. *P. tuberculata*, sp. nov. Frutex ramosissimus circiter 50 cm. altus; ramulis cano-tomentosis dense foliatis; foliis linearibus subacutis basi rotundatis supra grosse tuberculatis, marginibus arte revolutis; capitulis singulis hemisphaericis; bracteis lanceolatis extus villosis; floribus stipitatis; tubo late cyathiformi extus deciduo-pilosis, disco carnosus; sepalis ovatis supra medium convexis extus tomentosis; petalis sub sinibus calycis insertis, lamina elliptica vel rotundata concava apice paulum cucullata, ungue brevi lineari; ovario auguste obconico deciduo-piloso; stylo brevi; stigmatе conico.

A much branched shrub about 50 cm. high, with ascending, wiry branches. Branchlets slender, covered with white tomentum. Leaves closely set, 1—1.4 cm. long: lamina linear, subacute, rounded at base, somewhat incurved, with closely revolute margins covering the lower surface; upper surface coarsely tubercled, at first adpressedly pilose, at length glabrous: petiole 1—1.5 mm. long. Capitula solitary, 5—7 mm. wide, hemisphaeric, subtended by several long leaves. Bracts about 2.5 mm. long, lanceolate, villous on the outer surface. Bracteoles 2, about as long as the bracts, linear. Flowers 2.5 mm. long, stipitate: calyx-tube 0.75 mm. deep, broadly cyathiform, pilose with deciduous hairs on the outer surface, lined up to the mouth on the inner surface with a rather fleshy disc having a slightly raised annulus at its base: sepals 1 mm. long, ovate, convex above the middle, tomentose on the outer surface. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina elliptic or rotundate-elliptic, concave, slightly cucullate at the apex: claw short, linear. Anthers rotundate-cordate, 1-celled. Ovary narrowly obconic, pilose with deciduous hairs. Style 0.5 mm. long. Stigma conical.

**South Africa: Cape Province**—CERES DIV.: Koude Bokkeveld, Skurfdebergen, near Elandsfontein, *Schlechter* 10025 (in Bolus Herb.).

This species is closely related to *P. lasiocarpa*, Sond. from which it differs with coarsely tubercled leaves, the linear claw on the petals and the deciduous hairs on the ovary.

35. *P. longimontana*, sp. nov. Fruticulus ramosissimus; ramulis pubescentibus dense foliatis; foliis lanceolatis acutis basi rotundatis supra minute tuberculatis, marginibus paulum revolutis; capitulis singulis supra planisculis; bracteis acicularibus extus villosis; floribus stipitatis extus villosis; tubo late cyathiformi, disco crasso; sepalis deltoideo-ovatis planis supra medium sparse barbatis; petalis tubo calycis infra medium insertis, lamina rotundata vel orbiculari cucullata, ungue subaequilongo cuneato; ovario turbinato; stigmatе subsessili.

A much branched, dwarf shrub, wiry in the lower parts. Branchlets slender, clothed with spreading, grey pubescence. Leaves closely set,

5—7 mm. long : lamina spreading or erect-spreading, somewhat incurved, lanceolate, acute, rounded at base, with loosely revolute margins covering about half of the lower surface ; upper surface sparsely and minutely tubercled, at first sparsely pilose, soon becoming glabrous except upon the lower half of the midrib : petiole 1 mm. long. Capitula solitary, 4—7 mm. wide, almost flattened across the upper side, subtended by several leaves 4—6 mm. long. Bracts of the inner flowers about 2 mm. long, acicular, villous on the outer surface. Bracteoles sometimes present in the outer part of the capitulum. Flowers stipitate, 2—2.5 mm. long, with a covering of long, straight, white hairs : calyx-tube 0.5 mm. deep, broadly cyathiform, with a fleshy disc at the base : sepals 0.5 mm. long, deltoid-ovate, acute, flattened, with a sparse beard of rigid hairs on the upper half. Petals inserted on the lower half of the tube, scarcely 0.5 mm. long : lamina rotundate or orbicular, cucullate, with incurved margins : claw about as long, cuneate. Anthers rotundate-cordate, 1-celled. Ovary turbinate. Style and stigma together 0.5 mm. long, stout, the latter 3-humped.

**South Africa: Cape Province**—RIVERSDALE DIV.: Langeberg, *Schlechter* 1838 (in Bolus Herb.).

36. **P. brachycephala**, *Sond. in Harv. et Sond. Fl. Cap.* i, 500 (1860)! : **P. microcephala**, *Ecklon et Zeyher, Enum.* 133 (1835) absque descr., non Roem. et Schultes.

A much branched shrub about 60 cm. high. Branchlets short and slender, lightly clothed with short, grey pubescence. Leaves 3—6 mm. long : lamina usually spreading, lanceolate-linear, subacute or obtuse, apiculate, rounded or subcordate at base, slightly incurved, with closely revolute margins covering the lower surface ; upper surface smooth or minutely tubercled and at first pubescent on the sides, soon becoming glabrous : petiole 0.5—1 mm. long. Capitula 2—3 mm. wide, 1.5—2 mm. high, few- or many-flowered, subtended by 2 or 3 small leaves. Bracts 1.5 mm. long, setaceous, with a dense covering of white hairs on the dorsal surface. Bracteoles absent. Flowers sessile, 1.5—1.75 mm. long, with a dense covering of grey pubescence on the outer surface : calyx-tube 0.25 mm. deep, broadly cyathiform, lined with an inconspicuous disc : calyx-segments 0.75 mm. long, ovate, acute, flattened in the lower half, prominently convex in the upper. Petals at the mouth of the tube, scarcely 0.5 mm. long : lamina cucullate, reniform-orbicular : claw about as long, cuneate. Anthers 1-celled. Ovary obconic. Style 0.5 mm. long, conical. Stigma rounded, entire.

**South Africa: Cape Province**—SWELLENDAM DIV.: "hill sides above the farm of Gideon Joubert in Gannaland," *Ecklon and Zeyher* 1023.

37. **P. humilis**, *Sond. in Harv. et Sond. Fl. Cap.* i, 495 (1860)!



A dwarf, much branched shrub, 20—30 cm. high, with wiry stems. Branchlets very slender, clothed with grey pubescence. Leaves closely set, 1.75—2.5 mm. long: lamina ovate or lanceolate-ovate, obtuse or acute, deeply cordate at base, slightly incurved at apex, with revolute margins covering the lower surface; upper surface rounded, minutely punctate, at first puberulous and with a tuft of hairs about the apex, soon becoming glabrous: petiole very short, hidden. Capitula solitary, few-flowered, about 3 mm. wide, widely hemisphaeric, subtended by a few leaves. Bracts oblong or lanceolate, villous on the dorsal surface, shorter than the flowers. Bracteoles 1 or 2, acicular. Flowers stipitate, 1.5 mm. long, densely covered outside with ascending, coarse, white hairs: calyx-tube broadly cyathiform, with an inconspicuous disc at base within: sepals 0.5—0.75 mm. long, deltoid-ovate, acute, keeled down the upper half of the inner surface. Petals inserted at the mouth of the tube, scarcely 0.5 mm. long: lamina rotundate, cucullate: claw half to almost as long, linear. Anthers 1-celled. Ovary obovate. Style short and stout, trigonous. Stigma divided into 3 rounded lobes. Fruit 3 mm. long, obovate-rotundate, wrinkled, puberulous, red-brown, with a small depressed area on the summit.

**South Africa: Cape Province**—CALEDON DIV.: mountains near Grietje's Gat, between Sir Lowry's Pass and Palmiet River, *Ecklon*; Hermanus, *Rogers* 27237; Kleinmond, *Stokoe* 1311; base of Maanskuin Mt., near Hermanus, *Galpin in Bolus Herb.* 21340; east slope of Hangklip, *Pillans* 8262.

38. *P. Comptonii*, sp. nov. Frutex ramosissimus circiter 30 cm. altus; ramulis tomentosus dense foliatis; foliis oblongis vel ovato-oblongis obtusis basi cordatis supra minute tuberculatis primum tomentosus demum glabris, marginibus arte revolutis; capitulis singulis hemisphaericis; bracteis linearibus extus villosis; bracteolis deficientibus; floribus stipitatis medio paulum constrictis; tubo cyathiformi dense piloso, pilis deciduis retrorsis; sepalis ovatis extus villosis intus planis; petalis deficientibus; staminibus tubo medio insertis; antheris 1-loculatis; ovario anguste turbiniformi glabro; stylo crasso brevi.

A much branched, compact shrub, about 30 cm. high, with wiry branches. Branchlets slender, clothed with very short, grey tomentum. Leaves very closely set, 2—5 mm. long: lamina spreading, oblong or ovate-oblong, obtuse, cordate at base, semiterete, with closely revolute margins covering the lower surface; upper surface minutely tubercled, at first tomentose and with a tuft of straight, silky hairs at the apex, soon becoming glabrous: petiole very short. Capitula solitary, 5—8 mm. wide, hemisphaeric, involucred by a few leaves and outer bracts. Outer bracts 2—2.5 mm. long, oblong-lanceolate, villous on the outer

surface. Inner bracts about 2 mm. long, linear, villous on the outer surface. Bracteoles absent. Flowers shortly stipitate, 1·75—2·5 mm. long, slightly constricted between the tube and the ovary: calyx-tube 0·5 mm. deep or slightly less, cyathiform, with a dense covering of straight, deciduous, retrorse hairs reaching down to the base of the ovary: sepals 0·5—1 mm. long, ovate, acute, densely covered outside with ascending and spreading, long, white, persistent hairs, flattened and glabrous on the inner side. Petals absent. Stamens inserted half way up the tube. Anthers reniform, 1-celled. Ovary narrowly turbiniform, glabrous. Style short and stout. Stigma 3-lobed.

**South Africa: Cape Province**—CERES DIV.: near Laaken Vlei, Matroosberg, *Phillips* 2131.—WORCESTER DIV.: summit of Matroosberg, alt. 7,500 ft., *Gillett* 3606.—LAINGSBURG DIV.: summit of the Witteberg, alt. 4,500-5,000 ft., *Compton* 2649, 3567 (type, in Bolus Herb.).

The affinity of this species is with *P. retrorsa*, E. Mey. from which it may be distinguished by the smaller calyx, the retrorse hairs upon the tube and by the glabrous ovary.

39. ***P. retrorsa***, E. Mey. ex Sond. in *Harv. et Sond. Fl. Cap.* i, 492 (1860)! [*E. Mey. in Drège Zwei Pfl. Documente* 69 (1844) absque descr.]: ***Tylanthus retrorsus***, Presl, *Bot. Bemerk.* 37 (1844) absque descr.

A dwarf, ramulose shrub, with slender branches clothed with short, dense, grey pubescence. Leaves closely set, 1·5—2·5 mm. long: lamina somewhat retrorse or spreading, ovate, obtuse or tipped with an acute callus, cordate at base, subterete, with revolute margins almost covering the lower surface; upper surface tubercled, with a tuft of caducous, white hairs at the apex: petiole about 0·5 mm. long. Capitula solitary 6—9 mm. wide, many-flowered, hemisphaeric, with the axis often produced upwards, surrounded at base by scale-like expanded leaves. Bracts about 2·5 mm. long, oblanceolate, acute, flattened, villous on both sides. Bracteoles absent. Flowers sessile, 2·75—3 mm. long: calyx-tube 0·75 mm. deep, campanulate, covered outside with long, caducous, erect-spreading hairs: sepals 1 mm. long, narrowly ovate, acute, densely covered with long, silky hairs on the outside, glabrous on the inner surface. Petals absent (possibly sometimes present). Stamens inserted at the mouth of the tube. Anthers 1-celled. Ovary narrowly obconic, covered with long, caducous, silky, ascending hairs. Style 0·5 mm. high, stout, trigonous, widened into a shortly 3-lobed stigma.

**South Africa: Cape Province**—NAMAQUALAND: Khamiesberg, Roodeberg and Ezekop, *Drège* 3064.

W. Arnott states, Hook., Journ. Bot. iii, 253 (1841), that this species "agrees with *Trichocephalus* in the petals," implying that it has setaceous petals. There may have been petals in the flowers he examined but I have not found any in those flowers of Drège 3064 which I have examined.

40. *P. rubra*, Willd. ex Roem. et Schultes, *Syst.* v, 491 (1819)!; DC., *Prodr.* ii, 37 (1825); *D. Dietr., Syn. Pl.* i, 875 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 497 (1860) excl. var.  $\beta$ .

A much branched shrub, 1—2.5 m. high, stout in the lower parts, with wiry, reddish branches. Branchlets very numerous and very slender, sparsely covered with very short, soft, grey pubescence. Leaves closely set, 5—10 mm. long: lamina erect-spreading, linear or lanceolate, with an incurved mucro, rounded or subcordate at base; upper surface smooth or somewhat wrinkled, at first minutely and sparsely pilose on the midrib, with revolute margins covering all or most of the lower surface: petiole about 1 mm. long. Capitula very numerous, on the ends of short branches and paniced, about 3 mm. wide, relatively few-flowered, widely rounded or almost flattened above, subtended by 2 or 3 leaves. Bracts 0.5—1 mm. long, lanceolate, densely villous with white hairs on the outer surface. Bracteoles not seen. Flowers sessile, 1.25—1.5 mm. long, covered with white tomentum on the outer surface: calyx-tube broadly cyathiform, filled with a fleshy disc: sepals deltoid-ovate, acute, 0.75 mm. long, slightly convex, with the midrib prominent at the apex. Petals inserted at the mouth of the tube and attached to the margin of the disc, 0.25 mm. long: lamina rotundate, cucullate: claw about half as long, cuneate. Anthers 1-celled. Ovary obconic. Style scarcely 0.25 mm. long. Stigma divided into 3 rounded lobes. Fruit about 5 mm. long, rotundate, narrowed downwards, smooth, chestnut-brown, with a small, slightly concave calyx-base upon the summit.

**South Africa:** without precise locality, *Lichtenstein in Bot. Mus. Stockholm*, *Bowie* 38, *Zeyher* 319, 976.

**Cape Province**—CALEDON DIV.: Houwhoek, *Zeyher* 2216 partly.—SWELLENDAM DIV.: without precise locality, *Bowie* 20; Swellendam, *Niven* 13; base of mountains behind Swellendam, *Bolus* 7303, in *Herb. Norm. Austr.-Afr.* 620, *Esterhuysen* 4834, *Compton* 10573, *Smith* 2727.—RIVERSDALE DIV.: "near Kroombeeks River," *Burchell* 7178; Garcia's Pass, *Bolus* 11245, *Galpin* 3888, *Muir* 2631; Platte Kloof, *Muir* 491, 608.

41. *P. laevigata*, sp. nov. Fruticulus ramosissimus; ramulis gracilibus pubescentibus dense foliatis; foliis oblongo-lanceolatis obtusis vel apiculatis basi cordatis supra laevibus, marginibus arte revolutis; capitulis plerumque singulis paucifloris; bracteis oblongis extus villosis; floribus stipitatis extus villosis; tubo late cyathiformi; sepalis deltoideo-

ovatis apice convexis; petalis sub sinibus calycis insertis, lamina orbit culata cucullata, ungue aequilongo cuneato-oblongo; ovario obconico; stigmatibus sessilibus.

A much branched, dwarf shrub, with ascending wiry branches. Branchlets slender, with a dense covering of ascending, grey hairs. Leaves crowded, 4—5 mm. long: lamina erect-spreading or spreading, slightly incurved, oblong-lanceolate, obtuse or tipped with an apiculus, cordate at base, with closely revolute margins covering the lower surface or almost so; upper surface smooth, at first pilose on the margins and about the apex, becoming glabrous and shiny: petiole short, inconspicuous. Capitula usually solitary, 4—5 mm. wide, few-flowered, subtended by several short leaves and foliaceous bracts. Bracts about 2 mm. long, oblong, acute, villous on the outer surface. Bracteoles 2, sometimes absent, about half as long, linear. Flowers stipitate, 3—3.5 mm. long, closely covered outside with ascending, rather coarse, straight hairs: calyx-tube broadly cyathiform, lined with an inconspicuous disc: sepals 1 mm. long, deltoid-ovate, acute, convex at the apex. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina orbicular, cucullate: claw as long, cuneate-oblong. Anthers reniform, 1-celled. Ovary obconic. Stigma sessile, pulvinate. Fruit about 3 mm. long, obovate-rotundate, deeply furrowed, pilose or glabrate, surmounted by a small calyx-base.

**South Africa—Cape Province**—RIVERSDALE DIV.: Milkwoodfontein, 600 ft., *Galpin* 3886 (in Bolus Herb.).

42. ***P. cephalantha***, *Sond. in Harv. et Sond. Fl. Cap.* i, 501 (1860)!: ***Tylanthus diosmoides***, *Presl., Bot. Bemerk.* 38 (1844) absque descr.

A dense shrub about 40 cm. high, with ascending wiry branchlets covered with minute, cream-coloured tomentum. Leaves 5—8 mm. long: lamina erect-spreading, linear, obtuse, with closely revolute margins covering the lower surface; upper surface rounded, finely tubercled or almost smooth, at first minutely pubescent but very soon becoming glabrous: petiole about 1 mm. long. Capitula about 5 mm. wide, solitary or panicled, hemisphaeric, subtended by several leaves. Bracts 1.25—1.5 mm. long, linear, obtuse, closely covered on the dorsal surface with silky, buff-coloured hairs. Bracteoles 2 (often absent), minute, villous. Flowers 1.75—2 mm. long, on a slender stipe about 0.5 mm. long: calyx-tube broadly cyathiform filled with a fleshy disc having a free outer margin; outer surface covered with long, ascending, buff-coloured hairs: sepals 1 mm. long, ovate, acute, inner surface flattened, glabrous, with a slightly prominent midrib; outer surface covered with short, spreading, buff-coloured hairs. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina cucullate, orbicular: claw short, cuneate-

oblong. Anthers 1-celled. Ovary obconic, densely covered with long, ascending, silky, buff-coloured hairs. Style scarcely 0.5 mm. long, columnar. Stigma minute, 3-fid. Fruit about 8 mm. long, narrowly rotundate, usually widest above the middle, covered with short grey or buff tomentum, with a very small area on the summit.

**South Africa : Cape Province**—CAPE DIV. : Pinelands, *Salter* 8115 ; flats between Cape Town and Stellenbosch, *Burchell* 8348 ; Cape Flats, *Ecklon* 56 ; Rietvlei and Doornhoogte, *Ecklon and Zeyher* 1015 partly ; near the coast of False Bay, *Schlechter* 795 ; Durbanville, *Schlechter* 7826 ; Koeberg Road, 14 miles from Cape Town, *L. Bolus in Bolus Herb.* 18498.—MALMESBURY DIV. : Mamre, *Bolus* 4262 ; Hopefield, *Bachmann* 1471, in *Bolus Herb.* 18692, in *Guthrie Herb.* 2834 ; Kalabas Kraal, *F. and L. Bolus in Bolus Herb.* 18681 ; south-west base of the Paardeberg, *Pillans* 6168 ; between Darling and Hopefield, *Hutchinson* 262.—STELLENBOSCH DIV. : Gordon's Bay, *Markotter in Stell. Univ. Herb.* 8796.—PAARL DIV. : Kraaifontein, *Dümmer* 1559 partly.—CLANWILLIAM DIV. : Strandfontein at the mouth of the Olifants River, *Drège d. in Kew Herb.* ; Bergvlei, *Niven* ; Zeekoevlei, *Schlechter* 8485 ; Olifants River mountains, *Schlechter* 5102 ; Wupperthal, *Drège* 6762 ; Boekenberg, between Bergvlei and Langvlei, *Compton* 5057 ; Nardouw, *Compton* 6994.

43. **P. Greyii**, sp. nov. Frutex divaricate ramosus circiter 30 cm. altus ; ramulis adpresse pubescentibus ; foliis oblongo-lanceolatis obtusis basi cordatis supra laevibus, marginibus arte revolutis, petiolo brevissimi ; capitulis singulis orbicularibus ; bracteis oblongis obtusis supra medium foliaceis ; floribus pedicellatis ; tubo late cyathiformi extus sparse pubescente ; sepalis deltoideo-ovatis planis extus glabris vel basi sparse pubescentibus ; petalis sub sinibus calycis insertis, lamina rotundata cucullata, ungue fere aequilongo lineari-cuneata ; ovario obconico sparse pubescentibus ; stigmatibus subsessili.

A divaricately branched, wiry shrub, about 30 cm. high. Branchlets closely pubescent, slender. Leaves closely set, 4—5 mm. long, erect-spreading ; lamina oblong-lanceolate, obtuse, cordate at base, semiterete, laterally compressed at the apex, with closely revolute margins covering the lower surface ; upper surface smooth except for slight depressions ; petiole very short, hidden by the base of the lamina. Capitula solitary, at the ends of the branchlets, 4—5 mm. wide, orbicular, subtended by several short leaves. Bracts 1—1.5 mm. long, oblong, obtuse, pubescent at the base, leaf-like and glabrous in the upper half. Bracteoles about as long or longer, 2 or usually absent from the inner flowers, linear-lanceolate, pubescent except at the apex. Flowers 2 mm. long, on very short, pubescent pedicels, pentagonal in the upper half while in the bud stage ; calyx-tube broadly cyathiform, 0.5 mm. deep,

sparsely pubescent on the outer surface : sepals, 1 mm. long, deltoid-ovate, acute, flattened, slightly gibbous at the apex, glabrous or very sparsely pubescent at the base of the outer surface. Petals inserted at the mouth of the tube : lamina rotundate, cucullate : claw about as long, linear-cuneate. Anthers reniform, 1-celled. Ovary obconic, sparsely clothed with short, ascending pubescence. Style and stigma together 0.5 mm. long, stoutly columnar.

**South Africa : Cape Province**—MALMESBURY DIV. : Saldanha Bay, *Admiral Sir F. Grey* (in Kew Herb.).

This distinct species is remarkable for its pentagonal buds and almost glabrous sepals.

44. **P. Rogersii**, sp. nov. Frutex ramosissimus circiter 50 cm. altus ; ramulis breve adpresso-pubescentibus ; foliis linearibus vel lanceolato-linearibus mucronatis basi paulum cordatis, marginibus arte revolutis tuberculatis ; capitulis hemisphaericis ; bracteis obovatis vel oblongis extus villosis ; floribus sessilibus ; tubo late cyathiformi glabro ; sepalis deltoideo-ovatis acutis supra medium convexis extus dense tomentosis ; petalis sub sinibus calycis insertis, lamina orbiculata superne paulum cucullata, ungue brevi cuneato ; ovario late obconico glabro ; stigmatibus subsessili tripartito.

A much branched, rather lax shrub, about 50 cm. high, with wiry branches. Branchlets slender, clothed with short, adpressed pubescence. Leaves mostly 6—8 mm. long : lamina erect-spreading, linear or lanceolate-linear, mucronate, somewhat cordate at base, semiterete, often slightly recurved at the apex, with closely revolute margins covering the lower surface : upper surface conspicuously tubercled on the sides and about the apex, at first pilose or puberulous on those parts, elsewhere smooth : petiole 0.5—1 mm. long. Capitula 5—6 mm. wide, hemisphaeric, occasionally subtended by 2 or 3 short leaves, frequently on very short, sparsely leafy branchlets in panicle-like clusters. Bracts 2—2.5 mm. long, obovate or oblong, acute, villous on the outer surface. Bracteoles 2, 1.5—2 mm. long, linear, villous on the outer surface. Flowers sessile, about 2 mm. long : calyx-tube scarcely 0.5 mm. deep, broadly cyathiform, glabrous, lined with a thin disc : sepals 0.5 mm. long, deltoid-ovate, acute, convex above the middle, densely tomentose on the outer surface. Petals 0.5 mm. long, inserted at or shortly within the mouth of the tube : lamina orbicular, more or less cucullate in the upper part : claw about half as long, cuneate. Anthers orbicular, 1-celled. Ovary broadly obconic, glabrous. Stigma subsessile, tripartite. Fruit about 4 mm. long, obovate-rotundate, smooth or wrinkled, chestnut-brown, with a small calyx-area upon the summit.

**South Africa: Cape Province**—WORCESTER DIV.: Hex River mountains, *Bolus* 5146, 13085, 13086 (type); between Osplaats and Tunnel Siding, *Rogers* 16721; plateau on the Tafelberg, *Pillans in Bolus Herb.* 14153; Brandvlei, *Schlechter* 9938.—MONTAGU DIV.: hills at the hot baths, *Bolus* 7595, *Page* 72, *Levy's* 197; Kogman's Kloof, *Thode in Stell. Univ. Herb.* 5020, in *Natal Herb.* 16328, *Salter* 1120.

The affinity of this species is with *P. minutiflora*, Schltr. from which it differs in habit of growth and in the leaves.

45. *P. minutiflora*, Schltr. in *Engl. Bot. Jahrb.* xxiv, 440 (1897)!

A much branched shrub, about 60 cm. high, rigid in the lower parts. Branchlets slender, clothed with spreading, short, grey pubescence. Leaves crowded, mostly 5—10 mm. long: lamina erect-spreading, lanceolate-linear or linear, rounded at base, with an incurved mucro, semiterete, with the revolute margins covering the lower surface; upper surface almost smooth, obscurely tubercled and at first pilose on the margins: petiole about 1 mm. long. Capitula 3—5 mm. wide, few-flowered, almost hidden in side view by the subtending leaves. Bracts 1—1.5 mm. long, linear or lanceolate, villous on the outer surface. Bracteoles 2 or none, 1 mm. long, linear, villous. Flowers stipitate, 1.5—2 mm. long: calyx-tube 0.25 mm. deep, broadly cyathiform, filled with a fleshy disc, glabrous: sepals about 0.5 mm. long, ovate, acute, concave on the inner side, gibbous at the apex, tomentose on the outer surface. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina orbicular, cucullate: claw very short, oblong. Anthers 1-celled. Ovary obconic, glabrous. Style together with the obtusely 3-lobed stigma 0.5 mm. high. Fruit about 4 mm. long, rotundate, glabrous, with a small base of the calyx on the summit.

**South Africa: Cape Province**—CALEDON DIV.: Hottentots Holland Mts., near Sir Lowry's Pass, *Bolus* 5340, 7322, *Schlechter* 7208; Wolven Kloof, *Stokoe* 2569; Viljoen's Pass, *Gillett* 694; Hangklip, *Pillans* 8260.

46. *P. lucens*, sp. nov. Frutex ramosissimus circiter 50 cm. altus; ramulis pubescentibus superne dense foliatis; foliis linearibus acutis basi obtusis supra dense tuberculatis, marginibus arte revolutis; capitulis singulis depresso-hemisphaericis; bracteis oblanceolatis extus villosis; floribus stipitatis; tubo late cyathiformi glabro; sepalis deltoideo-ovatis planis supra medium carinatis extus dense tomentosis; petalis sub sinibus calycis insertis, lamina orbiculata cucullata, ungue subaequilongo lineari; ovario turbinato glabro; stigmatibus sessilibus.

A much branched shrub, about 50 cm. high, with ascending, wiry branches. Branchlets slender, clothed with short, spreading pubescence. Leaves very closely set, 8—10 mm. long: lamina erect-spreading, linear, acute, apiculate, rounded at base, semiterete, mostly straight, with

closely revolute margins covering the lower surface; upper surface closely tubercled, at first pubescent, soon becoming glabrous: petiole about 1.5 mm. long. Capitula solitary, 5—6 mm. wide, depressed-hemisphaeric, surrounded by several conspicuous leaves and the outer leaf-like bracts. Bracts of the inner flowers about 2 mm. long, oblanceolate, acute, villous on the outer surface. Bracteoles 2, almost as long, linear. Flowers about 2 mm. long, on a short villous stipe: calyx-tube widely cyathiform, glabrous: sepals 1 mm. long, deltoid-ovate, acute, flattened, keeled on the upper half, gibbous at the apex, densely tomentose on the outer surface. Petals inserted at the mouth of the tube: lamina orbicular, deeply concave, cucullate: claw about half as long, linear. Anthers reniform, 1-celled. Ovary turbinate, glabrous. Stigma sessile. Fruit about 5 mm. long, obovate, smooth, blackish, with a very small calyx-area.

**South Africa: Cape Province**—CALEDON DIV.: Wildepaardeberg, *Stokoe* 2743, 2744 (type, in Bolus Herb.), 2744a.

The affinity of this species is clearly with *P. minutiflora*, Schltr. from which it is easily distinguishable by the rather coarsely tubercled leaves.

47. ***P. Willdenowiana***, *Ecklon et Zeyher, Enum.* 135 (1835)!; *D. Dietr., Syn. Pl.* i, 876 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 486 (1860): ***P. rosmarinifolia***, *Schlecht. in Linnaea* vi, 195 (1831) absque descr., non Thunb. nec aliorum: ***Soulangia Willdenowiana***, *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 386 (1839) excl. syn. *P. rosmarinifolia*: ***Tylanthus Willdenowianus***, *Presl, Bot. Bemerk.* 38 (1844) absque descr.

Plants about 60 cm. in height, much branched. Branchlets clothed with short grey pubescence. Leaves crowded 0.5—1.5 cm. long: lamina erect-spreading, linear or linear-lanceolate, mucronulate, rounded at base, with revolute margins covering the whole or greater part of the lower surface; upper surface finely tubercled, at first furnished with grey, silky pubescence, becoming glabrous: petiole about 1 mm. long. Inflorescence a many flowered capituliform raceme 0.5—1 cm. long and 0.7—1.2 cm. wide or a lax raceme about 1 cm. long with the vegetative axis produced beyond the flowers. Bracts foliaceous, reaching to the summit of the flowers or longer. Bracteoles absent. Pedicels 1—3 mm. long, clothed with grey pubescence. Flowers 3.5—5 mm. long, covered on the outside with short or long, almost straight, grey hairs: calyx-tube 0.75—2.5 mm. deep, cyathiform,  $\pm$  5-angled, lined up the sides with a thin disc: sepals deltoid-ovate, acute, 1—1.25 mm. long, erect-spreading, flattened, with a prominent nerve from base to apex: petals at the mouth of the tube, 0.75 mm. long; lamina cucullate, orbicular, sub-cordate at base; claw scarcely a third as long, narrowly cuneate or



oblong : anthers 1-celled. Ovary turbinate : style 1.5—2 mm. long, subulate, narrowed into a small, entire stigma reaching to about the middle or summit of the petals. Fruit 5—6 mm. long, rotundate, becoming glabrous and blackish, with 10 vertical ridges, with a moderately sized depressed area on the summit.

**South Africa : Cape Province**—GEORGE DIV. : Montagu Pass, *Fourcade* 3248, 3846, *Compton* 5149 ; Doorn River, *Thorne in S.A. Mus. Herb.* 51709.—HUMANSDORP DIV. : Zitzikama *Pappe in S.A. Mus. Herb.* 15017 ; Loerie Plantation, *Dix* 157.—UITENHAGE DIV. : Elandsriver Berg, *Zeyher* 2219 ; Van Stadens Berg, *Zeyher* 275, 342, 932, 2218, 2220, *Ecklon and Zeyher* 1035, *MacOwan* 1073, *Paterson* 880, 2103, 2432.—PORT ELIZABETH DIV. : near Fort Frederick, *Burchell* 4335 ; Port Elizabeth, *Paterson* 1113 ; Red House, *Paterson* 602, 2103A ; Cape Road, *Holland* 3876 ; near Green Bushes, *Holland* 3837 ; Vaal Vlei Estate, *Mogg* 4653.

The collectings cited above include several forms having apparently distinctive characters, but these cannot be satisfactorily separated as varieties. Briefly they are :—form A the typical, in which the inflorescence is a conspicuous, crowded raceme about 1 cm. long, the flowers being covered with long hairs : form B in which the inflorescence is lax, the flowers being covered with shorter hairs : form C in which the inflorescence is an inconspicuous capituliform raceme rarely longer than 0.5 cm., the flowers small with very short hairs on their lower parts.

48. *P. costata*, sp. nov. Frutex ramosissimus circiter 35 cm. altus ; ramulis tomentosis ; foliis linearibus acutis basi acutis tuberculatis, marginibus arte revolutis ; capitulis singulis laxe paucifloris ; bracteis foliaceis ; bracteolis deficientibus ; floribus stipitatis medio constrictis extus niveo-tomentosis ; tubo urceolato ; sepalis ovatis acutis intus anguste carinatis ; petalis sub sinibus calycis insertis, lamina obovata valde cucullata basi attenuata, ungue cuneato ; ovario turbiniformi ; stylo longo subulato.

A much branched, dense shrub, about 35 cm. high, with ascending, wiry branches and slender, shortly tomentose branchlets. Leaves moderately spaced, 0.7—1 cm. long, erect-spreading or spreading : lamina linear, callus-acute, rounded at base, semiterete, with closely revolute margins covering the lower surface ; upper surface tubercled, at first silky-villous, becoming glabrous : petiole 2.5—3 mm. long, much compressed. Capitula very numerous, solitary at the ends of the branchlets, 5—7 mm. wide, loosely 4—6-flowered, surrounded and overtopped by several leaves. Bracts of the outer flowers about 5 mm. long, foliaceous, those of the inner flowers about half as long. Bracteoles absent. Flowers about 5 mm. long, stipitate, constricted between the

tube and the ovary, clothed with grey tomentum on the outer surface, but least densely so on the tube : calyx-tube 2.5—3 mm. deep, urceolate, with 9 slightly raised longitudinal ridges on the outer surface, without any apparent disc within : sepals 1.5 mm. long, ovate, acute, with a narrow keel up the middle of the inner surface. Petals inserted at the mouth of the tube, 1 mm. long : lamina obovate, deeply cucullate, tapered at base into a short cuneate claw. Anthers reniform, 1-celled. Ovary turbinate. Style 3.5 mm. long, slender. Stigma minute, shortly 3-lobed. Fruit 5 mm. long, rotundate, sparsely tomentose, pale brown, surmounted by a small calyx-area.

**South Africa : Cape Province**—PRINCE ALBERT DIV. : Zwart Berg, alt. 6,000 ft., *Stokoe* 6371 (type, in Bolus Herb.), in *South African Mus.* 49981 ; Zwartberg Pass, *Stokoe* 6288.

The affinity of this species is probably closest with *P. Willdenowiana*, E. and Z. from which it chiefly differs with leaves which are not attenuate and are more coarsely tubercled, with stipitate flowers, an urceolate calyx-tube and a narrow calyx-area on the fruit.

49. **P. dioica**, *Linn.*, *Syst.* ed. 10, p. 938 (1759)! ; *Sp. Pl.* ed. 2, p. 283 (1762) ; *Syst. Nat.* ed. 12, ii, 180 (1767) ; ed. 13, ii, 180 (1770) ; *Mant.* 342 (1771) ; *Syst. Veg.* ed. 13, p. 196 (1774) ; *Lam., Illus.* ii, 79 (1793) ; *Willd.*, *Sp. Pl.* i, 1111 (1798) ; *Poir. in Lam. Encycl.* v, 294 (1804) ; *Pers.*, *Syn. Pl.* i, 245 (1805) ; *Roem. et Schultes, Syst. Veg.* v, 488 (1819) ; *DC.*, *Prodr.* ii, 37 (1825) ; *Richter, Syst. Gen. et Sp.* 212 (1840) : **P. reflexa**, *Lam., Illus.* ii, 79! ; *Poir. in Lam. Encycl.* v, 291, excl. syn. omn. ; *Sond. in Harv. et Sond. Fl. Cap.* i, 489 (1860) excl. syn. Commel. ; *Marloth, Fl. S. Africa* i, tab. 22 (1913) : **P. buxifolia**, *Thunb.*, *Prodr. Cap.* 45 (1794)! non *Linn.* ; *Diss. Phyllica* 9 (1804) ; *Fl. Cap.* 88 (1818) : **Soulangia dioica**, *Don, Gen. Syst.* ii, 43 (1832) : **S. cordata**, *Ecklon et Zeyher, Enum.* 137 (1835) !

A much branched shrub, 0.5—1 m. high, rigid in its lower parts. Branchlets covered with buff coloured tomentum with which are mingled longer, straight hairs. Leaves 1.3—1.8 cm. long : lamina erect-spreading or spreading, ovate, obtuse, rounded or subcordate at base ; upper surface slightly revolute at the margins, tubercled, at first pubescent ; lower surface mostly exposed, with evident secondary nerves, closely covered with short, white tomentum : petiole 3—5 mm. long. Capitula 1.3—1.5 cm. wide, surrounded by many leaves with elongated petioles, flattened above, much wider than the depth. Bracts of the outer flowers about 8 mm. long, foliaceous. Bracts of the inner flowers 3—4 mm. long, subulate, covered with long, ascending, fulvous hairs. Bracteoles absent. Flowers 5—5.5 mm. long, slightly arcuate, on pedicels 0.75—1 mm. long, with a dense covering outside of long, fulvous hairs, glabrous

on the inner surface : calyx-tube 2.75—3 mm. deep, narrowly cyathiform: sepals 1—1.25 mm. long, ovate, acute, with the midrib slightly raised above the inner surface. Petals inserted at the mouth of the tube, 1 mm. long ; lamina widely ovate or subrotundate, cucullate above the middle, with involute margins : claw about 0.25 mm. long. Anthers 1-celled. Ovary obconic. Style 3 mm. long, terete, slender, tapered into a shortly conical, entire stigma.

**South Africa** : without precise locality, *Oldenburg, Thunberg, Sparrman, Sonnerat, Gaudichaud, Harvey, Wahlberg.*

**Cape Province**—CAPE DIV. : Table Mt., *Ludwig and Berg in Berlin Herb., Ecklon and Zeyher* 1049, *Moss* 4508, *Thode in Stell. Univ. Herb.* 6173 ; summit of Table Mt., *Burchell* 517, *Ecklon* 630, *Schormberg in Galpin Herb.* 4862 ; Kasteels Poort, *Alexander Prior, Kensit in Bolus Herb.* 11429 ; lower plateau on Table Mt., *Bond* 103, *Pillans* 3777, 6121, 6123, *Britten* 3142 ; Wynberg Caves, *Compton* 6346 ; summit of Twelve Apostles, *Wolley-Dod* 2295 ; rocky hills above the head of Silver Mine River, *Pillans* 6117, 6125 ; summit of Constantiaberg, *Compton* 8216 ; summit of the Muizenberg, *Pillans* 6118 ; Muizenberg, *Krook* 438 ; summit of Klasjagersberg, *Wolley-Dod*, 306 ; mountains near Cape Town, *Bolus* 2744.—STELLENBOSCH DIV. : mountains near Stellenbosch, *Niven* 8.

50. **P. Mundii**, sp. nov. Frutex paulum ramosus circiter 40 cm. altus ; ramulis adpresso-pubescentibus dense foliatus ; foliis acicularibus vel anguste linearibus acutis basi rotundatis supra minute tuberculatis primum adpresse villosis, marginibus arte revolutis ; racemis densis multifloris ; floribus extus tomentosis villosisque ; tubo anguste campanulato angulato ; sepalis deltoideo-ovatis planis ; petalis sub sinibus calycis insertis, lamina rotundata cucullata ; ungue brevi cuneato ; ovario obconico ; stylo subulato.

A moderately branched shrub, about 40 cm. high, with ascending, rather rigidly wiry branches which are commonly virgate. Branchlets clothed with adpressed, silky pubescence. Leaves closely set, often imbricate, 1.2—1.6 cm. long : lamina ascending, mostly curved above the middle, acicular or narrowly linear, acute, rounded at base, semi-terete, with closely revolute margins covering the lower surface ; upper surface closely and minutely tubercled, at first covered with adpressed, silky, white hairs, tardily becoming glabrous : petiole 1—2 mm. long. Inflorescence a dense, many-flowered raceme, 2—4 cm. long, 1—1.5 cm. wide. Flowers 7—8 mm. long, on villous pedicels 1—2.5 mm. long, in the axils of reduced leaves : calyx-tube 3—3.5 mm. deep, narrowly campanulate, pentagonal, tomentose and villous on the outer surface : sepals 2.5—3 mm. long, deltoid-ovate, acute, flattened, with a prominent midrib, tomentose and silky-villous on the outer surface.

Petals inserted at the mouth of the tube, 1·5—2 mm. long: lamina rotundate, deeply concave, cucullate: claw about half as long, cuneate or oblong-cuneate. Anthers reniform, 1-celled. Ovary obconic, densely covered with spreading, silky hairs. Style 4—5 mm. long, subulate, reaching to about the middle of the petals. Stigma small, capitate. Fruit about 9 mm. long, pedicellate, obconic, sparsely villous, blackish, with a very wide, convex calyx-area occupying the summit.

**South Africa: Cape Province**—CALEDON DIV.: Paardeberg, *Mund and Maire*; mountains near Houwhoek, *Bolus* 5148; Zwartberg, *Ryder* 89.—RIVERSDALE DIV.: in a valley on the farm Welbedacht, *Ferguson in Bolus Herb.* 19457 (type).

While having a close resemblance to *P. villosa*, Thunb. var. *pedicellata* (Sond.) this species is probably most nearly related to *P. willdenowiana*, E. & Z. but is distinguished by different leaves, much larger flowers and different petals.

51. **P. gnidioides**, *Ecklon et Zeyher, Enum.* 135 (1835)!; *D. Dietr., Syn. Pl.* i, 876 (1839); *Meisn. in Hook. London Journ. Bot.* ii, 58 (1843); *Sond. in Harv. et Sond. Fl. Cap.* i, 501 (1860): **P. juniperifolia**, *Ecklon et Zeyher l.c.* absque descr.: **Calophylca gnidioides**, *Presl, Bot. Bemerk.* 39 (1844) cum descr.: **C. juniperifolia**, *Presl l.c.* absque descr.

A much branched shrub, up to 90 cm. high. Branchlets slender, clothed with adpressed, grey pubescence. Leaves crowded, mostly 8—10 mm. long: lamina erect-spreading, linear, mucronulate, rounded at base, with closely revolute margins covering the lower surface, dorsally compressed at the sides; upper surface smooth, at first ciliate on the edges: petiole about 1 mm. long. Capitula often clustered, 1·5—2 cm. wide, hemisphaeric, laxly many-flowered, surrounded at base by many ciliate leaves with enlarged petioles. Bracts of the inner flowers about 6 mm. long, linear-lanceolate, ciliate, puberulous on the outer surface. Bracteoles absent. Flowers 8—11 mm. long, stipitate, constricted between the tube and the ovary, covered outside with very short grey tomentum: calyx-tube 4·5—5 mm. deep, oblong-tubular, with a small, entire, cupular disc at the base within: sepals 2·5 mm. long, oblong-lanceolate, acute; inner surface convex, glabrous, slightly keeled on the upper half. Petals inserted in the mouth of the tube, 1·25—1·5 mm. long: lamina widely ovate, cucullate, minutely pustulate on the dorsal surface: claw as long, cuneate-oblong. Anthers 1-celled. Ovary turbinate, constricted at the summit. Style 2·5 mm. long, filiform, terete. Stigma capitate, obscurely lobed. Fruit 10—11 mm. long, rotundate, velvety pubescent, with a very small depression on the summit.

**South Africa:** without precise locality, *Drège* 7360, *Zeyher* 215.

**Cape Province**—HUMANSDORP DIV.: Clarkson, *Schlechter* 6018; dune country at Slang River, *Fourcade* 2166; Hankey road, *Fourcade* 2244.—UITENHAGE DIV.: near Van Staden's, *Burchell* 4609, 4615.—PORT ELIZABETH DIV.: hills near Port Elizabeth, *Burchell* 4370, *Zeyher* 1037; sandy flats near Port Elizabeth, *Burchell* 4278, *Zeyher* 3746, *Cooper* 1453, *Bolus* 1049, *Tyson* 2191, *West* 459, *Cruden* 412; Algoa Bay, *Zeyher* 975, *Cooper* 1453, *Salter* 372/7; Earn Cliff, *Galpin* 6359; Thescomb, *Paterson* 1021; Vaal Vlei Estate, *Mogg* 4712.—BATHURST DIV.: Rietfontein, *Burchell* 3919, 3952.—ALBANY DIV.: Botha's Hill, *Ecklon and Zeyher* 1038, *MacOwan* 778, 1135, in *Natal Govt. Herb.* 1109, *Mrs. H. Hutton* 471, *Misses Daly and Sole* 206, 442a; mountains near Grahamstown, *Schlechter* 2620, *Glass in Herb. Austr.-Afr.* 1419; Howison's Poort, *Glass* 13; Coldspring, *Glass* 525; between Grahamstown and Howison's Poort, *Dyer* 456.

52. *P. abietina*, *Ecklon et Zeyher, Enum.* 132 (1835)!; *D. Dietr., Syn. Pl.* i, 874 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 502 (1860): *Tylanthus abietinus*, *Presl, Bot. Bemerk.* 38 (1844) absque descr.

A much branched shrub, about 60 cm. high. Branchlets slender, covered with short, adpressed, grey pubescence. Leaves closely set, 4–6 mm. long: lamina erect-spreading, linear-lanceolate, with a laterally compressed, truncate apex, mucronulate, rounded at base, with closely revolute margins covering the lower surface; upper surface smooth, at first pubescent on the margins, soon glabrous: petiole about 1 mm. long, pubescent. Capitula solitary, about 1 cm. wide, rotundate, surrounded at base by many leaves with enlarged petioles. Bracts about 5 mm. long, linear, acuminate, covered on the outer surface with silky, white hairs. Bracteoles 2, similar to the bracts but much shorter. Flowers 6–8 mm. long, subsessile: calyx-tube 3–4 mm. deep, cylindrical, slightly widened at the mouth, covered with short, white tomentum on the outer surface, glabrous on the inner: sepals 1.5 mm. long, lanceolate-ovate, acute, flattened; outer surface densely white-tomentose and villous; inner surface glabrous, with a prominent midrib. Petals inserted at the mouth of the tube, 0.75 mm. long: lamina cordate, incurved at the sides, somewhat cucullate at the apex: claw short, oblong. Anthers 2-celled, 0.5 mm. long, cordate in side view, truncate at apex. Ovary obconic, covered with ascending, silky, white hairs. Style 3.5–4.75 mm. long, slender, terete. Stigma 0.25 mm. long, clavate, reaching to the upper half of the petals. Fruit about 5 mm. long, rotundate, velvety pubescent, with many sulcae and a small area on the summit.

**South Africa: Cape Province**—UNIONDALE DIV.: Tusschen Bij, about the watershed between Gamtoos and Kromme Rivers, 18 miles

north-west of Humansdorp, *Fourcade* 480.—HUMANSDORP DIV.: 5 miles from Humansdorp on the Hankey road, *Fourcade* 4583—UITENHAGE DIV.: west slopes of the Winterhoek mountains, *Ecklon and Zeyher* 1013.

There is an uncommon form in which many of the leaves at the base of the capitulum exceed 1 cm. in length and are for the most part flattened, purplish and resemble involucreal scales.

53. *P. lachneaeoides*, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis pubescentibus dense foliatis; foliis linearibus vel lanceolato-linearibus apiculatis basi obtusis supra laevibus, marginibus arte revolutis; capitulis plerumque aggregatis; bracteis linearibus supra medium subfoliaceis; bracteolis deficientibus; floribus ad medium constrictis extus cano tomentosus; tubo angusto; sepalis lanceolato-ovatis intus paulum carinatis; petalis tubo sinibus calycis insertis, lamina cordata cucullata, ungue brevi subquadrato; antheris cordatis biloculatis; ovario turbinato pubescente; stylo subulato; stigmatibus capitato.

A much branched, wiry shrub, about 60 cm. high. Branchlets slender, clothed with short, subadpressed pubescence. Leaves closely set, 5—8 mm. long: lamina erect-spreading or ascending, slightly incurved, linear or lanceolate-linear, apiculate, rounded at base, with closely revolute margins covering the lower surface; upper surface smooth and glabrous, at first minutely pubescent on the sides and about the apex: petiole about 1 mm. long. Capitula usually clustered, 8—12 mm. wide, laxly many-flowered, surrounded at base by several leaves and outer, foliaceous bracts. Bracts of the inner flowers 4—5 mm. long, linear, subfoliaceous above the middle, pubescent on the sides and lower half of the outer surface. Bracteoles absent. Flowers stipitate, 6—8 mm. long, constricted between the tube and the ovary, covered outside, except on the ovary, with short, white tomentum: calyx-tube 4—4.5 mm. deep, tubular: sepals 1.75—2 mm. long, lanceolate-ovate, flattened, slightly keeled down the inner face. Petals inserted at the mouth of the tube, 0.75—1 mm. long: lamina cordate, obtuse, cucullate, with incurved margins: claw scarcely half as long, subquadrate. Anthers widely cordate 2-celled. Ovary turbinate, velvety-pubescent. Style slender, 4.5—5.5 mm. long. Stigma capitate, reaching above the petals. Fruit usually solitary, about 6 mm. long, elliptic-rotundate, deeply furrowed, covered with greenish, velvety pubescence, surmounted by a very small calyx-base.

**South Africa: Cape Province**—GEORGE DIV.: without precise locality, *Bowie* 15; Long Kloof, hills north of Ganz Kraal, *Fourcade* 3823 (type, in Bolus Herb.).—UNIONDALE DIV.: between Wagenbooms

River and Long Kloof, *Burchell* 4892; Kromme River heights, *Fourcade* 3614; *Lauterwater*, *Compton* 4239; Kouga, *Bond* 907, *Compton* 4606, *Esterhuysen* 4686; near Joubertina, *Compton* 5145.—HUMANSDORP DIV.: near Humansdorp, *Kennedy* 175; Kromme River, 4 miles west of Company's Drift, *Fourcade* 2319.

The affinity of this species is with *P. gnidioides*, E. & Z. from which it is distinguished by shorter leaves, cordate, shortly clawed petals and a much longer style.

54. **P. Fourcadei**, sp. nov. Frutex ramosissimus circiter 45 cm. altus; ramulis sparse pubescentibus; foliis lineari-lanceolatis mucronulatis basi rotundatis supra laevibus, marginibus arte revolutis; capitulis rotundatis; bracteis linearibus extus pubescentibus; bracteolis deficientibus; floribus stipitatis extus tomentosis; tubo infundibuliformi; sepalis ovato-lanceolatis convexis; petalis sub sinibus calycis insertis, lamina elliptico-ovata cucullata, ungue lineari-cuneato vel oblongo; ovario turbinato; stylo subulato; stigmatibus capitato.

A much branched shrub, about 45 cm. high, with wiry branches. Branchlets slender, sparsely covered with short, subadpressed pubescence. Leaves usually closely set, 5—7 mm. long: lamina somewhat incurved, linear-lanceolate, mucronulate and laterally compressed at the apex, rounded at base, semiterete or widely convex above, with closely revolute margins covering the lower surface; upper surface smooth, at first minutely pubescent on the margins and about the apex: petiole about 1 mm. long. Capitula about 1 cm. wide, on short branchlets and usually clustered, rotundate, loosely many-flowered, subtended by several leaves. Bracts of the outer flowers about 5 mm. long, foliaceous, with an enlarged, pubescent petiole. Bracts of the inner flowers about 5 mm. long, linear or acicular, subfoliaceous above the middle, pubescent on most of the outer surface. Bracteoles absent. Flowers stipitate, 0.9—1.3 cm. long, covered outside with short, white tomentum: calyx-tube 6—8 mm. deep, infundibuliform-tubular: sepals 2.75—3 mm. long, ovate-lanceolate, acute, keeled down the inner face, with incurved, papillose margins. Petals inserted at the mouth of the tube, 1.5—1.75 mm. long: lamina elliptic-ovate, obtuse, concave, cucullate at the apex, with incurved margins: claw about half as long, linear-cuneate or oblong. Anthers 0.5 mm. long, cordate, 2-celled: cells truncate at the upper end. Ovary turbinate. Style 7—9 mm. long, slender, sparsely and minutely setose below the capitate stigma which is on a level with the apex of the petals or above. Fruit about 5 mm. long, rotundate, velvety-pubescent, green, surmounted by a small calyx-base.

**South Africa: Cape Province**—UNIONDALE DIV.: top of old pass between Avontuur and Uniondale, 3,500 ft., *Fourcade* 2095 (type, in

Bolus Herb.), 3802; at the Groote River in Long Kloof, *Burchell* 5001; between Misgund and Ongelegen, 2,700 ft., *Fourcade* 4264; De Hoop, *Esterhuysen* 4697, *Compton* 10541.—HUMANSDORP DIV.: elevated situations near Gamtoos River, *Niven* 3.

The smaller, scarcely compressed leaves and much longer style distinguish this species from *P. gnidioides*, E. & Z.

55. *P. tubulosa*, *Schltr. in Engl. Bot. Jahrb.* xxvii, 170 (1899)!

A dwarf, moderately branched shrub, with ascending, wiry branches. Branchlets rather slender, with a dense covering of short, white tomentum. Leaves very crowded, 3—5 mm. long: lamina erect-spreading, slightly incurved, linear-oblong or lanceolate, obtuse or tipped with an acute callus, cordate at base, with closely revolute margins covering the lower surface or nearly so; upper surface smooth, at first pubescent on the margins and at the apex. Petiole 1 mm. long. Capitula hemisphaeric, few-flowered, about 8 mm. wide, subtended by a few short leaves. Bracts about 3 mm. long, foliaceous, densely villous on the outer surface and lower half of the inner. Bracteoles 2, 1.5 mm. long, linear densely villous. Flowers shortly stipitate, 4—4.5 mm. long, covered outside with short tomentum: calyx-tube 2.5 mm. deep, oblong-tubular: sepals 1 mm. long, erect-spreading, ovate, glabrous on the inner surface, with a slight keel down the middle. Petals inserted at the mouth of the tube, 0.5 mm. long: lamina cordate, obtuse, cucullate: claw very short, cuneate. Anthers 1-celled. Ovary obconic. Style 1.25—2 mm. long, slender. Stigma not widened, short.

**South Africa: Cape Province**—CALEDON DIV.: "summit and upper part of the Great Mountain of Baviaans Kloof," near Genadendal, *Burchell* 7694, *Schlechter* 9836, *Stokoe in Bolus Herb.* 22181; *Wildepaardeberg*, *Stokoe* 2745.

56. *P. diosmoides*, *Sond. in Harv. et Sond. Fl. Cap.* i, 496 (1860)!

A moderately branched shrub about 30 cm. high. Branchlets wiry, clothed with short, grey tomentum with which are mingled longer, spreading, silky hairs. Leaves closely set, 1—1.5 cm. long: lamina ascending or erect-spreading, lanceolate or linear-lanceolate, apiculate, rounded at base, somewhat incurved, with revolute margins covering a half or less of the lower surface; upper surface inconspicuously tubercled and at first villous on the margins, smooth up the middle: petiole about 2 mm. long. Capitula usually solitary 1—1.2 cm. wide, hemisphaeric, surrounded by several leaves and the foliaceous bracts of the outer flowers. Inner bracts scarcely as long as the flowers, linear-lanceolate, villous. Bracteoles absent. Flowers stipitate, 3.5—4 mm. long: calyx-tube 1—1.5 mm. deep, cyathiform, with a sparse covering outside of long, ascending, grey, deciduous hairs: sepals 0.75—1.25 mm. long,



ovate, acute, with a prominent midrib, clothed outside with long, ascending, grey hairs. Petals inserted at the mouth of the tube, 0.75 mm. long: lamina cordate-ovate, rounded at the summit, deeply concave, cucullate at apex, with involute margins: claw scarcely half as long, cuneate. Anthers 1-celled. Ovary obconic, covered with long, ascending, deciduous hairs. Style 1.5—1.75 mm. long, subulate. Stigma small, divided into 3 minute, rounded lobes. Fruit about 3.5 mm. long, obovate-rotundate, wrinkled, glabrous, chestnut-brown, with a small, depressed area on the summit.

**South Africa: Cape Province**—CALEDON DIV.: stony places between Houw Hoek and Bot River, *Zeyher*; hills around Houw Hoek, *Bolus* 18688, *Schlechter* 7769.

57. **P. ampliata**, sp. nov. Frutex ramosissimus circiter 90 cm. altus: ramulis tomentosis; foliis ovatis basi obtusis planis marginibus revolutis infra laevibus marginibus pustulatis subtus tomentosis; floribus stipitatis extus tomentosis axillaribus aggregatis; bracteolis minutis vel deficientibus; tubo cyathiformi; sepalis deltoideo-ovatis planis nervo prominenti; petalis cucullatis sub sinibus calycis insertis; ovario anguste obconico; stylo elongato basi ampliato.

A much branched shrub about 90 cm. high. Branchlets slender, clothed with short, grey tomentum, and sparsely pilose. Leaves 6—8 mm. long: lamina erect-spreading, ovate, acute, widely rounded at base, flattened except for the revolute margins which cover about a quarter of the lower surface, pustulate and at first pilose on the margins, otherwise smooth on the upper surface: petiole short, ascending. Flowers 3.5—4 mm. long, on a villous stipe, clothed outside with grey tomentum. in the axils of upper leaves, assembled in a head-like cluster about 8 mm. wide. Bracteoles absent or present, minute, densely villous. Calyx-tube 1.5 mm. deep, cyathiform, lined with the disc up to the mouth. Sepals 1 mm. long, deltoid-ovate, flattened, with a distinct median nerve. Petals inserted at the mouth of the tube, 0.5 mm. long; the lamina cordate, deeply cucullate; the claw about a third as long, narrowly cuneate. Anthers reniform. Ovary narrowly obconic. Style 1.75 mm. long, subulate, distinctly thickened in the lower half. Stigma minute.

**South Africa: Cape Province**—TULBAGH DIV.: north-west aspect in the kloof above Tulbagh Waterfall, *Esterhuysen* 1583 (in *Bolus* Herb.).

58. **P. imberbis**, *Berg.*, *Descr. Pl. Cap.* 51 (1767); *Linn.*, *Mant. altera* 209 (1771); *Thunb.*, *Prodr.* 44 (1794); *Willd.*, *Sp. Pl.* i, 1109 (1798); *Thunb.*, *Diss. Phyllica* 5 (1804); *Pers.*, *Syn. Pl.* i, 245 (1805); *Thunb.*, *Fl. Cap.* 81 (1818); *Roem. et Schultes*, *Syst. Veg.* v, 480 (1819); *Thunb.*, *Fl. Cap.* ed. 2, p. 201 (1823); *Linn.*, *Syst. Veg.* ed. 16, i, 827

(1825); *DC., Prodr.* ii, 35 (1825); *Don, Gen. Syst.* ii, 42 (1832); *D. Dietr., Syn. Pl.* i, 874 (1839); *Richter, Syst. Gen. et Sp.* 212 (1840): [**Erica africana**—*Seba, Thes.* ii, p. 50, tab. 49, fig. 5 (1735)]: **P. brunioides**, *Lam., Illus.* ii, 78 (1793); *Poir. in Lam. Encycl.* v, 288 (1804): **P. rosmarinifolia**, *Lodd., Bot. Cab.* tab. 849 (1824) non *Lam.*: **Tylanthus imberbis**, *Presl, Bot. Bemerk.* 37 (1844) absque descr.: **T. rosmarinifolius**, *Presl, Bot. Bemerk.* 38, absque descr., quoad E. & Z. 1036: **P. eriophoros**, *Berg. var. imberbis*, *Sond. in Harv. et Sond. Fl. Cap.* i, 501 (1860): **P. strigulosa**, *Marl., Fl. S. Afr.* ii, §2, tab. 56, fig. A (1925) non *Sond.*

A moderately branched shrub, usually 30—40 cm. in height, up to 60 cm. high, with wiry stems. Branchlets clothed with short, adpressed, grey pubescence with which are occasionally intermingled spreading, silky hairs. Leaves closely set, mostly 7—12 mm. long: lamina ascending or erect-spreading, linear or lanceolate-linear, acute or obtuse, rounded at base, with closely revolute margins entirely covering the lower surface or almost so; upper surface smooth or wrinkled, except for finely tubercled margins, or finely and closely tubercled throughout, at first pilose on the margins and midrib or clothed with adpressed, silky, grey hairs: petiole up to 1 mm. long. Capitula normally solitary, 7—10 mm. wide, hemisphaeric or rarely subconic. Bracts 1.75—3 mm. long, linear or lanceolate, with adpressed pubescence on the outer surface. Bracteoles 2, about half as long, similar. Flowers 3.5—5 mm. long: calyx-tube 1—1.5 mm. deep, cyathiform, more or less 5-angled, covered outside with short, soft, reflexed or spreading, grey hairs, with an annular disc at the base: sepals about 1.5 mm. long, ovate, acute; inner surface with a prominent keel up the middle; outer surface covered with ascending grey hairs. Petals inserted at or near the mouth of the tube, 0.75—1.25 mm. long: lamina cordate, acute, more or less cucullate, somewhat compressed laterally in the upper half with incurved sides: claw very short, transversely oblong. Anthers 2-celled, cordate in back view: cells broadly elliptic, somewhat obliquely truncate at apex, with posterior margins diverging from apex to base. Ovary turbinate, covered with reflexed, spreading or very rarely ascending, short, grey hairs. Style 0.75—1.5 mm. long, trigonous or terete. Stigma conical and entire or with 3 erect lobes. Fruit 6—7 mm. long, rotundate, puberulous, purple-brown, with a small depressed area on the summit.

**South Africa:** without precise locality, *Oldenburg* 1009 in *Brit. Mus. Herb., Thom.* 842.

**Cape Province**—CAPE DIV.: Cape Flats, *Ecklon* 633 partly, *Bowie* 14, *Roxburgh* 25, *Lehmann, Bolus* 3282; sandy flats near *Rondebosch, Burchell* 207, *Wolley-Dod* 988; Diocesan College, *Rondebosch, Pillans* 6124; Cape Flats near *Claremont, Schlechter* 342, 344; *Doornhoogte*,

Cape Flats, *Zeyher* 763; Kenilworth, *Flanagan* 2451; north slopes of Table Mt., *Wolley-Dod* 40; Table Mt., *Thode in Stell. Univ. Herb.* 6172; west slopes of Table Mt., *Wolley-Dod* 1361; Orange Kloof, *Wolley-Dod* 2138; slopes above Kirstenbosch, *Hutchinson* 33, 42; Wynberg Hill, *Gamble* 22292; Camp's Bay, *Wilms* 3116; mountain slopes near Hout Bay, *Schlechter* 964; flats at the base of the Steenberg, *Pillans* 6115; on the Muizenberg, *Krook* 439, *Pillans* 4330, *Moss* 4175; east slope of hill south of Kalk Bay, *Pillans* 4914; Little Lion's Head, *Pillans* 4422; Slangkop, *Pillans* 4319; Smitswinkel Bay, *Moss* 4509.—STELLENBOSCH DIV.: road between Stellenbosch and Jonker's Valley, *Burchell* 8337; Hottentots Holland, *Ecklon and Zeyher* 1036 partly; Stellenbosch, *Krook* 450, *Duthie* 1000, 1600a; Gordon's Bay mountains, *Markotter in Stell. Univ. Herb.* 8713, 8795.—PAARL DIV.: Du Toit's Kloof, *Tyson* 832; Berg River Hoek, *Compton* 8362.—MALMESBURY DIV.: Riebeeek's Kasteel, *Pillans* 6095, 6096.—CALEDON DIV.: Ganze Kraal by the Slang River, *Burchell* 7556; Zwartberg, *Guthrie in Bolus Herb.* 18962; coast between Pringle Bay and Hangklip, *Pillans* 8252; summit of Elands Kloof Pass, *Gillett* 729.—CERES DIV.: mountains above Michell's Pass, *Schlechter* 9950.—CLANWILLIAM DIV.: Lamberts Kloof Berg, *Wallich* 513; Driehoek, Cedarberg, *Compton* 6212.—RIVERSDALE DIV.: Garcia's Pass, *Marloth* 3571b, *Salter* 6796.—GEORGE DIV.: George, *Alexander Prior in Kew Herb.*—PRINCE ALBERT DIV.: Zwartberg, *Pocock* S.220.

**Var.  $\beta$ , eriophoros** (*Pillans*): **P. eriophoros**, *Berg. Pl. Cap.* 52 (1767); *Ait., Hort. Kew.* i, 268 (1789); *Willd., Sp. Pl.* i, 1109 (1798); *Pers., Syn. Pl.* i, 245 (1805); *Ait., Hort. Kew.* ed. 2, vol. ii, p. 20 (1811); *D. Dietr., Syn. Pl.* i, 875 (1839): [**Thymelaea e Cap. B. Spei**, *Petiv., Mus.* 42 (1695): **Tamariscus aethiopicus**, *Pluken., Mant.* 178 (1700): **Elichrysum aethiopicum**, *Pluken., Amalth.* 72, tab. 445, fig. 1 (1705): **Eriophoros aethiopica**, *Pluken., Amalth.* 74 (1705)]: **P. rosmarinifolia**, *Lam., Illus.* ii, 77 (1793); *Poir. in Lam. Encycl.* v, 289 (1804); *Pers., Syn. Pl.* i, 245 (1805); *Roem. et Schultes, Syst. Veg.* v, 479 excl. syn. *Lam. et Poir.* 485 (1819); *DC., Prodr.* ii, 35 (1825); *Don, Gen. Syst.* ii, 41 (1832) excl. syn. *Lodd.*; *D. Dietr., Syn. Pl.* i, 874 (1839): **P. nitida**, *Lam., Illus.* ii, 77; *Poir. in Lam. Encycl.* v, 291; *Linn., Syst. Veg.* ed. 16, i, 827 (1825); *DC., Prodr.* ii, 35 (1825); *Don, Gen. Syst.* ii, 41 excl. vars.; *D. Dietr., Syn. Pl.* i, 875: **P. lanceolata**, *Thunb., Prodr. Cap.* 44 (1794); *Willd., Sp. Pl.* i, 1108 (1798); *Poir. in Lam. Encycl.* v, 294; *Thunb., Diss. Phyllica* 4 (1804); *Pers., Syn. Pl.* i, 245; *Ait., Hort. Kew.* ed. 2, vol. ii, p. 19; *Thunb., Fl. Cap.* 79 (1818); *Roem. et Schultes, Syst. Veg.* v, 478; *Thunb., Fl. Cap.* ed. 2, p. 200 (1823); *Linn., Syst. Veg.* ed. 16, i, 827 excl. syn. omn.; *DC., Prodr.* ii, 35; *Don, Gen. Syst.* ii, 41; *D. Dietr., Syn. Pl.* i, 875: **P. corifolia**, *Salisb., Prodr.* 140 (1796) absque descr.: **P. nitida**,

var. **erriophoros**, *Don, Gen. Syst.* ii, 41 (1832): **P. arborescens**, *Link ex Steud. Nom.* ed. 2, para. 3, p. 325 (1841) absque descr.: **Tylanthus lanceolatus**, *Presl, Bot. Bemerk.* 38 (1844) absque descr.: **T. rosmarinifolius**, *Presl. Lc. excl. E. et Z.* 1036: **Phyllica erriophoros**, var. **Bergiana**, *Sond. in Harv. et Sond. Fl. Cap.* i, 500 (1860)!

Plants usually more robust and with most parts larger than in the typical variety of the species. Hairs upon the upper leaves, the bracts and flowers are almost always longer and more conspicuous. Leaves occasionally up to 2 cm. in length. Capitula often subconic, occasionally up to 1.5 cm. long and wide. Bracts up to 4 mm. long. Bracteoles up to 3 mm. long. Flowers up to 6 mm. long. Fruit sometimes almost glabrous.

**South Africa**: without precise locality, *Masson, Thunberg, Sonnerat, Verreaux, Harvey* 684, *Wright* 186, *Boivin* 692.

**Cape Province**—CAPE DIV.: Table Mt., *Wahlberg, Pillans* 4912; Devil's Peak, *Thode in Stell. Univ. Herb.* 6171; Orange Kloof, *Wolley-Dod* 2908, 6265; Wynberg, *Ecklon and Zeyher* 1034 partly; Oudekraal, *Phillips* 241; Noord Hoek mts., *Pillans* 4913, 6114; on the Muizenberg, *Bolus* 4524, 7192; Kalk Bay mts., *Pillans* 6185; hills west of Simon's Town, *Schlechter* 316, *Pillans* 4320, *L. Bolus in Bolus Herb.* 15501; Red Hill, *Compton* 6062; Simon's Berg, *Wolley-Dod* 287, *Pillans* 4326, 4417; Witsand, *Salter* 8309; Kommetje, *Salter* 248/21B; Klaver Valley, *Salter* 248/21; Cape Flats, *Rehmann* 2020.—STELLENBOSCH DIV.: Hottentots Holland mts., *Ecklon and Zeyher* 1036 partly; Stellenbosch hills, *Niven* 11; slopes near Somerset West, *Bolus* 5337, in *Herb. Norm. Austr.-Afr.* 133; Sir Lowry's Pass, *Bolus* 4121, in *Bolus Herb.* 18678.—PAARL DIV.: Du Toit's Kloof, *Drège* 1911; Groot Drakenstein, *Rogers* 10512; Dal Josaphat, *Tyson* 920; near Salem, *Barker in Bolus Herb.* 19469.—CALEDON DIV.: Palmiet River, *Zeyher* 968; Houwhoek, *Schlechter* 7443.—BREDASDORP DIV.: Potberg, *Pillans* 9354.—CERES DIV.: Michell's Pass, *Diels* 1069, *Stokoe* 2057.—PIQUETBERG DIV.: Twenty-four Rivers, *Niven* 14.—CLANWILLIAM DIV.: Elandsberg, *Wallich*; Middelberg, *Leipoldt* 883.—CALVINIA DIV.: Nieuwoudtville, *Leipoldt in Bolus Herb.* 18670; between Grasberg River and Waterfall, *Drège* 6769.—WORCESTER DIV.: Brandvlei, *Rehmann* 2386, 2387.—MOSSEL BAY DIV.: between Mossel Bay and Zout River, *Burchell* 6329; rocky sand hills north of Mossel Bay, *Burchell* 6302; near the landing place, Mossel Bay, *Burchell* 6309; Mossel Bay, *Brother Moran in Bolus Herb.* 18676; Goliath's Berg, *Muir* 2195.—GEORGE DIV.: between George and Knysna, *Zeyher*.—UNIONDALE DIV.: Uitkomst, *Compton* 10254.

**Var.  $\gamma$ , secunda** (*Sond.*) in *Harv. et Sond. Fl. Cap.* i, 501 (1860):

**P. secunda**, *Thunb., Prodr. Cap.* 44 (1794)!; *Diss. Phylica* 6 (1804); *Fl. Cap.* 82 (1818); *Roem. et Schultes, Syst. Veg.* v, 481 (1819); *Thunb., Fl. Cap.* ed. 2, p. 201 (1823); *DC., Prodr.*, ii, 35 (1825); *Don, Gen. Syst.* ii, 41 (1832): **P. rosmarinifolia**, *Spreng. in Linn. Syst. Veg.* ed. 16. i, 827 (1825) non Lam.: **Tylanthus secundus**, *Presl, Bot. Bemerk.* 38 (1844) absque descr.: branches glabrous or almost so; leaves 1.2—2.2 cm. long, linear or accrose, mucronate, smooth and glabrous or subglabrous above, mostly recurved and often secund; flowers slightly larger than in the typical variety of the species.

**South Africa**: without precise locality, *Thunberg, Drège* 6759, *Ecklon and Zeyher* 1034 partly, *Harvey* 5016.

**Cape Province**—CAPE DIV.: “plain between Cape Town and the foot of Table Mt.,” *Burchell* 38; flats at Rondebosch, *Burchell* 716; Cape Flats, *Ecklon* 633 partly; Claremont Flats, *Schlechter* 342; near Black River, *Wolley-Dod* 2728; Table Mt., *Tyson* 2390, *Schomburg in Galpin Herb.* 4861; slopes at base of Devil’s Peak, *Bolus* 4494, *A. Prior in Kew Herb.*; Camp’s Bay, *Rogers* 3021; Miller’s Point, *Wolley-Dod* 2286.—PAAERL DIV.: Du Toit’s Kloof, *Drege b in Kew Herb.*—CALEDON DIV.: Baviaans Kloof at Genadendal, *Burchell* 7622.—CERES DIV.: near Ceres, *Bolus in Bolus Herb.* 18674.

The presence of large, hairy galls at the ends of the branchlets is not uncommon in the typical form of this species. They very much resemble normal capitula and are often preserved as such in herbaria.

59. **P. strigulosa**, *Sond. in Harv. et Sond. Fl. Cap.* i, 498 (1860)! : **P. eriophoros**, *Thunb., Prodr.* 44 (1794)! non Berg.; *Diss. Phylica* 5 (1804); *Fl. Cap.* 80 (1818) excl. syn. Willd. et Berg.; id. ed. 2, p. 200 (1823).

A much branched wiry shrub, about 30 cm. high. Branchlets ascending, rather slender, clothed with adpressed, silky, grey pubescence. Leaves mostly 1.2—1.5 cm. long: lamina ascending to erect-spreading, often secund, linear or subulate, acute, frequently recurved at the apex, rounded at base, with closely revolute margins covering the lower surface or almost so; upper surface minutely tubercled, often pitted, with adpressed, grey pubescence, eventually glabrous: petiole about 1 mm. long. Spikes dense, capituliform, about 1 cm. long, up to 1.5 cm., conical or rotundate. Bracts 3.5—4 mm. long, linear-lanceolate, acute, covered with adpressed hairs except at the base within. Bracteoles 2, about 1 mm. long, lanceolate, clothed on the outer surface with long, rough hairs. Flowers 5—6.5 mm. long: calyx-tube about 2 mm. deep, covered outside with stiff, retrorse hairs: sepals 2.25—2.5 mm. long, lanceolate, acute, covered on the outer surface with adpressed, stiff hairs directed towards the apex; slightly convex, glabrous and with a median keel on the inner surface. Petals inserted at the mouth of the

tube, 1—1.25 mm. long : lamina ovate, shortly cucullate at the apex, with incurved margins : claw minute, transversely oblong. Anthers 2-celled, 0.75 mm. long, cordate in front view : cells elliptic, with their backs contiguous. Ovary broadly obconic, clothed with stiff, retrorse hairs. Style about 1.5 mm. long, stout. Stigma narrowly conical, entire or trifid, reaching to about the middle of the tube. Fruit 7—8 mm. long, rotundate, narrowed towards the base, with 3 furrows from base to summit, slightly wrinkled, puberulous or glabrous, dark brown, with a small depressed area on the top.

**South Africa** : without precise locality, *Thunberg*, *Masson*, *Burchell* 958, *Drège*, *Sieber* 113.

**Cape Province**—CAPE DIV. : 2 miles west of Philadelphia, *Pillans* 6182 ; upper southern slopes of Kanonberg, *Pillans* 6298.—STELLENBOSCH DIV. : Marais' Park, Stellenbosch, *Duthie* 457, 457a.—MALMESBURY DIV. : Darling, *Bachmann* 600 ; top of Botma's Pass, Riebeek Kasteel, *Pillans* 6269 ; sandy, middle slopes of Riebeek Kasteel, *Levyns* 3109.—TULBAGH DIV. : between Tulbagh and the Frostdy, *Burchell* 1035 ; Saron, *Schlechter* 7855.—PIQUETBERG DIV. : flats at Kromme River, *Zeyher* 321 ; slopes of the Piquetberg near Goedverwacht, *Bolus* 18672 ; Versfeld's Pass, *Compton* 10899 ; Porterville, *Edwards in Bolus Herb.* 18499.

60. **P. strigosa**, *Berg.*, *Descr. Pl. Cap.* 50 (1767)! excl. syn. *Seba* ; *Lam.*, *Illus.* ii, 78 (1793) ; *Thunb.*, *Prodr. Cap.* 44 (1794) ; *ej. Diss. Phylica* 4 (1804) ; *Poir. in Lam. Encycl. Bot.* v, 289 (1804) ; *Thunb.*, *Fl. Cap.* 80 (1818) ; ed. 2, p. 200 (1823) ; *Linn.*, *Syst. Veg.* ed. 16, i, 828 (1825) ; *Ecklon et Zeyher, Enum.* 134 (1835) incl. var. ; *D. Dietr.*, *Syn. Pl.* i, 875 (1839) : [**Chamelaea africana**—*Herm.*, *Cat. Pl. Afr.* 6 (1737)] : **P. bicolor**, *Linn.*, *Mant. altera* 208 (1771)! ; *ej. Syst. Veg.* ed. 13, p. 196 (1774) ; ed. 14, p. 235 (1784) ; *Lam.*, *Illus.* ii, 78 (1793) ; *Linn.*, *Syst. Veg.* ed. 15, p. 246 (1797) ; *Willd.*, *Sp. Pl.* i, 1108 (1798) ; *Poir. in Lam. Encycl. Bot.* v, 289 ; *Pers.*, *Syn. Pl.* i, 245 (1805) ; *Roem. et Schultes, Syst. Veg.* v, 479 (1819) ; *DC.*, *Prodr.* ii, 35 (1825) ; *Don, Gen. Syst.* ii, 41 (1832) ; *Linn.*, *Sp. Pl. ed. Richter* 212 (1840) ; *Sond. in Harv. et Sond. Fl. Cap.* i, 498 (1860).

A much branched shrub, up to 1 m. high, rather rigid in the lower parts, with ascending branches. Branchlets wiry, villous. Leaves closely set, 1—2 cm. long : lamina erect-spreading, linear-lanceolate, acute, rounded at base, with revolute margins covering a half or more of the lower surface ; upper surface tubercled and at first pilose on the margins, about the apex and on the midrib : petiole 1.5—3 mm. long. Capitula usually solitary, 1.2—1.8 cm. wide, hemisphaeric or orbicular, subtended by several leaves with fulvous hairs. Bracts leaf-like, 4—5

mm. long, oblong in the lower half, ovate or lanceolate above, hirsute on the outer surface with buff hairs. Bracteoles similar but shorter and narrower. Flowers shortly stipitate, 5—8 mm. long: calyx-tube 2—3 mm. deep, narrowly cyathiform, terete, covered outside with retrorse hairs; sepals 1.5—2.5 mm. long, ovate, acute, covered on the outer surface by long, ascending, coarse, grey hairs, keeled down the inner surface. Petals inserted at the mouth of the tube, 1—1.5 mm. long: lamina ovate, obtuse, cucullate, incurved at the margins, papillose on the outer surface: claw very short, as broad as long. Anthers 2-celled, oblong or linear-oblong in rear view; the cells elliptic-oblong, obtuse, with the posterior margins parallel except where they merge towards the apex. Ovary turbinate, covered with retrorse hairs. Style about 1 mm. long, slender. Stigma subclavate, sometimes with 3 connivent-erect lobes, not reaching to the base of the anthers. Fruit about 6 mm. long, rotundate, subtrilobed, almost smooth, villous upon the summit, sparsely pubescent on the lower parts, chestnut brown, with a small calyx-base on the top.

**South Africa:** without precise locality, *Oldenburg in Brit. Mus. Herb.* 1506, *Auge in Bot. Mus. Stockholm*, *Thunberg*, *Masson*, *Wahlberg*, *Roxburgh*, *Verreaux*, *Lalande*, *Alexander Prior*, *Sieber* 190, *Bowie* 5.

**Cape Province**—CAPE DIV.: Table Mt., *Ecklon and Zeyher* 1030, *Krebs in Berlin Herb.* 9, *Guthrie* 1472, *Thode in Stell. Univ. Herb.* 6163, 6164, 8413; east slopes of Table Mt., *MacOwan* 2534, *Pillans* 6112; Kasteel's Poort, *Zeyher* 4735, *L. Kents in Bolus Herb.* 18699, *Pillans* 4325; lower plateau on Table Mt., *Ecklon* 631; Devil's Peak, *Niven*, *Bolus* 4716, in *Bolus Herb.* 18682, *Wilms* 3113, *Wolley-Dod* 1044; Disa Gorge, *Compton* 10642, *Pillans* 4915; top of Skeleton Gorge, *Bond* 184; Nursery Gorge, *Pillans* 6122; summit of the Twelve Apostles, *Wolley-Dod* 2394; Orange Kloof, *Wolley-Dod* 921; plateau on the Vlakkeberg, *Pillans* 3919; Steenberg, *Ecklon* 234; on the Muizenberg, *MacOwan* 2466, in *Herb. Norm. Austr.-Afr.* 187, *Bolus* 4536, *Schlechter* 606, *Salter* 248/16; mountain above Kalk Bay, *Wahlberg*, *Levyus*; upper east face of Chapman's Peak, *Pillans* 9025; east slope of Zwartkop Range, *Pillans* 8877;.

**Var.  $\beta$ , australis** (*Pillans* var. nov.); a slenderer plant; leaves 8—10 mm. long, linear; capitula rotundate, 8—10 mm. wide; flowers 4—4.5 mm. long; calyx-tube and ovary covered with silky, grey hairs; fruit scarcely 5 mm. long, glabrate.

**Cape Province**—CAPE DIV.: south base of Chapman's Peak, *Pillans* 6126 (type), in *Bolus Herb.* 15486, *Salter in Bolus Herb.* 22180; near the coast at Schuster's Bay, *Pillans* 8554.

**Var.  $\gamma$ , Drégei** (*Pillans* var. nov.); leaves about 1 cm. long, in

shape and substance as in the typical variety; capitula about 1 cm. wide; flowers 5·5 mm. long.

**Cape Province**—WORCESTER DIV.: Hex River mountains, *Drège* 245. [The material seen is unsatisfactory but it probably represents a distinct variety.]

**Var. δ, MacOwani** (*Pillans* var. nov.); leaves mostly shorter than in the typical variety; capitula rotundate, about 1 cm. wide; flowers about 4 mm. long; calyx-tube covered with silky hairs.

**Cape Province**—CAPE DIV.: Cape Flats near Durban Road, *MacOwan* 2290 (type), 2751; Raapenburg, Mowbray, *F. Guthrie in Bolus Herb.* 22386; Uitvlugt, *Guthrie* 877; Milnerton, *Salter* 8168; hills near Durbanville, *Guthrie* 2398.

**Var. ε, elongata** (*Pillans* var. nov.); plants up to 1·5 m. high, with wiry stems; leaf-lamina linear, sometimes villous over the entire upper surface, with closely revolute margins covering the lower surface; capitula 8—10 mm. wide, rotundate; flowers 4—4·5 mm. long; fruit about 4 mm. long, orbicular, glabrous.

**Cape Province**—MALMESBURY DIV.: near Hopefield, *Bachmann* 123, 1826, *Bolus* 12644 (type); between Matjesfontein and Klipfontein, *Bachmann* 1786; between Darling and Hopefield, *Hutchinson* 260.

The type of this species was collected by Auge and is preserved in the Natural History Museum, Stockholm.

61. **P. Stokoei**, sp. nov. Frutex ramosissimus circiter 50 cm. altus; ramulis tomentosis dense foliatis; foliis linearibus obtusis vel apiculatis basi rotundatis supra paulum scabridis, marginibus arte revolutis; capitulis singulis paucifloris; bracteis foliaceis extus aureo-villosis; floribus stipitatis extus aureo-villosis; tubo cyathiformi; sepalis lanceolato-ovatis supra medium carinatis; petalis sub sinibus calycis insertis, lamina ovata cucullata, ungue minuto subquadrato; antheris sensim biloculatis; ovario turbinato; stylo subulato; stigmati breve cylindrico.

A much branched shrub about 50 cm. high, with ascending, wiry branches. Branchlets slender, densely clothed with short, buff-coloured tomentum. Leaves closely set, 0·8—1 cm. long; lamina linear, obtuse or apiculate, rounded at base, erect-spreading, somewhat incurved, with closely revolute margins covering the lower surface; upper surface slightly rough with obscure tubercles, at first pubescent with golden hairs, at length glabrous; petiole 1·5—2 mm. long. Capitula solitary, about 5 mm. wide, few-flowered, surrounded and overtopped by very closely set leaves in 2 or 3 series. Bracts 4—5 mm. long, leaf-like but smaller, covered with straight, golden hairs on the dorsal surface. Bracteoles absent. Flowers stipitate, 4·5—5 mm. long, clothed on the outer surface with adpressed, straight, golden hairs; calyx-tube about 1·5 mm.



deep, cyathiform, lined up to the mouth with a thin disc having the upper margin free: sepals 2 mm. long, erect-spreading, lanceolate-ovate, subacute, with a prominent, blunt, minutely setaceo-papillate keel down the upper half of the inner surface. Petals inserted at the mouth of the tube, 1 mm. long: lamina ovate, cucullate, with incurved margins: claw minute, subquadrate. Anthers 0.75 mm. long, 2-celled, apiculate, the cells elliptic, distinct. Ovary turbinate, with hairs longer than those upon the tube. Style 1—1.5 mm. long. Stigma shortly cylindrical, obtuse, entire or 3-lobed, scarcely reaching up to the margin of the disc. Fruit 4—5 mm. long, obovate-rotundate, sub-trilobed, sparsely villous, red-brown, with a small calyx-area.

**South Africa: Cape Province**—PRINCE ALBERT DIV.: north slopes of the Klein Zwarteberg, west of Klein Zwarteberg Peak, 5750 feet, *Stokoe* 1845 (type, in Bolus Herb.), *Andreae* 1256.

The alliance of this species is with *P. excelsa*, Wendl. from which it differs by the different direction of growth of the hairs on the calyx-tube and ovary and in having longer sepals.

62. *P. excelsa*, Wendl., *Collect.* iii, 3, tab. 74 (1819)!; *Roem. et Schultes, Syst. Veg.* v, 490 (1819); *DC., Prodr.* ii, 35 (1825); *Don., Gen. Syst.* ii, 41 (1832); *Sond. in Harv. et Sond. Fl. Cap.* i, 488 (1860): *P. albida*, *Presl, Bot. Bemerk.* 38 (1844)! *absque descr.*

A moderately branched shrub, up to about 1 m. high, mostly with virgate branches. Branchlets rather slender, sparsely covered with short, grey pubescence with which are mingled long, silky hairs. Leaves often very closely set, 0.7—1.5 cm. long: lamina ascending or erect-spreading, lanceolate, lanceolate-linear or acerose, acute, apiculate, rounded at base, with revolute margins covering the lower surface except for the midrib; upper surface with small tubercles, pilose on the margins, eventually glabrous; petiole 1.25—1.5 mm. long. Capitula solitary, 1—1.5 cm. long, conical or rotundate, densely many-flowered, subtended by leaves with fulvous pubescence. Bracts about 4 mm. long, foliaceous, dorsally pubescent, with long, rather coarse, fulvous marginal hairs. Bracteoles 2, about 2.5 mm. long, linear, dorsally villous. Flowers sessile, 4.5—5 mm. long: calyx-tube 1.75—2 mm. long, cyathiform, 5-sided, covered outside with short, retrorse, grey, silky hairs: sepals erect-spreading, 1.5—1.75 mm. long, ovate, acute; outer surface puberulous and with long, ascending, coarse, fulvous hairs; inner surface with a distinct median ridge from base to apex. Petals inserted at the mouth of the tube, about 1.25 mm. long: lamina cordate, acute, complicate-cucullate, with incurved margins, apiculate, rugulose on the dorsal surface: claw minute, subquadrate. Anthers about 0.5 mm. long, cordate, 2-celled; the open cells broadly elliptic, somewhat ob-

liquely truncate at apex. Ovary obconic, angular, covered with retrorse, grey, silky hairs. Style 1.5—2 mm. long, slender. Stigma 0.5 mm. long, subulate, with 3 connivent-erect lobes. Fruit 6—7 mm. long, obovate-rotundate, wrinkled, puberulous, chestnut-brown. with a small depressed area on the summit.

**South Africa: Cape Province**—CAPE DIV.: north side of Table Mt., *Burchell* 575.—CALEDON DIV.: mountains of Baviaans Kloof, Genadendal, *Burchell* 7673, *Schlechter* 9796, *Bolus* 7380; north side of the mountains of Baviaans Kloof, *Burchell* 7888.—WORCESTER DIV.: Omklaarberg, *Stokoe* 1095b.

**Var.  $\beta$ , papillosa** (*Sond. in Harv. et Sond. Fl. Cap.* i, 488): **P. papillosa**, *Wendl. Collect.* iii, 5, tab. 75; *DC., Prodr.* ii, 35 (1825); *Don, Gen. Syst.* ii, 42; *Roem. et Schultes., Syst. Veg.* v, 490 (1819): **P. spicata**, *Sims in Curt. Bot. Mag.* tab. 2704 (1826): **P. cylindrica**, *Eckl. et Zeyher, Enum.* 134 (1835)! absque descr.; **P. fulva**, *Eckl. et Zeyher l.c.!*; *D. Dietr., Syn. Pl.* i, 876 (1839): **P. excelsa**, var. **brevifolia**, *Sond. l.c.!*; var. **laxa**, *Sond. l.c.!*; var. **stricta**, *Sond. l.c.!*; **Tylanthus excelsus**, *Presl, Bot. Bemerk.* 38 (1844) absque descr.: plants up to 3 m. high: leaves up to 2 cm. long; the lamina tuberculate and at first villous over the whole of the upper surface: inflorescence often elongating and becoming spiciform, occasionally up to 2.5 cm. long.

**South Africa:** without precise locality, *Rogers* 17615, *Hutchinson* 423.

**Cape Province**—CAPE DIV.: among rocks on the Constantia Berg, *Schlechter* 876; Table Mt., *Hafstrom in Bolus Herb.* 21653.—STELLENBOSCH DIV.: Hottentots Holland, near Somerset West, *Ecklon and Zeyher* 1029.—PAARL DIV.: Du Toit's Kloof, *Drège* 1912, *Stokoe in Bolus Herb.* 21316; Berg River Hoek, *Compton* 8334; Bain's Kloof, *Bolus* 4030, *Schlechter* 9118, *Pillans* 7045, *Salter* 373/10, *Smith* 2687, *Compton* 3919, *Kies* 29; mountains south of Wemmer's Hoek, *Andraea* 755; April Peak, *Compton* 10171.—CALEDON DIV.: Zwartberg, *Pappe*; mountains at Genadendal, *Stokoe* 2504; Wildepaardeberg, *Stokoe* 2747; Elands Kloof, *Compton* 4684.—TULBAGH DIV.: Winterhoek Mt., *Drège* 6775; near Tulbagh Waterfall, *Ecklon and Zeyher* 1032, *Stokoe* 1464; Roodezand, *Niven* 18; Tulbagh Kloof, *Schlechter* 7493.—CERES DIV.: Michell's Pass, *MacOwan* 2630, *Guthrie* 2136, 3182, *Marloth* 1696, *Schlechter* 9965, *Stokoe* 2067, *Levyns* 1068, *Walgate* 243; mountains west of Ceres, *Hutchinson* 608; Roodeberg, *Esterhuysen* 1476, *Compton* 8395.—WORCESTER DIV.: Hex River mountains, *Rehmann* 2534, 2535, 2711, *in Bolus Herb.* 5615, 5616; Audensberg, *Compton* 9785; Zanddrift Kloof, *Stokoe in Bolus Herb.* 21318.—MONTAGU DIV.: Koo, *Stokoe in Bolus Herb.* 21317.

63. **P. velutina**, *Sond. in Harv. et Sond. Fl. Cap.* i, 487 (1860)!.

A sparsely branched shrub, about 30 cm. high, with ascending, wiry branches. Branchlets clothed with short, subadpressed pubescence. Leaves closely set, ascending or erect-spreading, 1.3—2.3 cm. long: lamina acicular, acute, apiculate, rounded at base, often spreading at the apex, with closely revolute margins covering the lower surface; upper surface minutely scabrid, closely covered with adpressed, subpersistent grey pubescence: petiole about 1 mm. long, flattened. Spikes 2—5 cm. long, dense, 6—8 mm. wide (excluding bracts), cylindrical, tapered at the apex. Bracts foliaceous, erect-spreading or spreading, 1.3—2.3 cm. long, narrowly linear, densely silky villous with buff hairs on both sides, considerably over-topping the flowers and giving the inflorescence a plumose appearance. Bracteoles 2, often absent, 2—3 mm. long, linear, puberulous. Flowers shortly stipitate, 5—6 mm. long: calyx-tube 2—2.25 mm. deep, cyathiform, obscurely pentagonal, with a low annulus at the base within, clothed outside with short, spreading or erect-spreading hairs: sepals 1.5—2 mm. long, deltoid-ovate, acute, with a narrow keel from apex to base on the inner surface, velvety pubescent on the outer surface. Petals inserted at the mouth of the tube, 1 mm. long: lamina cordate, deeply concave, cucullate at the apex; claw very short, subquadrate. Anthers cordate in front view, 2-celled. Ovary obconic, narrower than and separated from the tube by a constriction, clothed with short, ascending pubescence. Style 1.5—2 mm. long, slender, striate. Stigma 0.25—0.5 mm. long, cylindrical, entire. Fruit 7—8 mm. long, rotundate, wrinkled, chestnut-brown, puberulous, with a small calyx-area upon the summit.

**South Africa:** without precise locality, *Drege* 6776.

**Cape Province**—RIVERSDALE DIV.: "hills north-west from station at Zoetmelk's River," *Burchell* 6775; lower slopes below Garcia's Pass, *Burchell* 6924; towards the white cliff north-east of Zoetmelks River, *Burchell* 6669; Kleinberg at Plattekloof, *Muir* 367; Corenti River, *Muir* 2205; Langeberg above Plattekloof, *Muir* 4595, in *Galpin Herb.* 5176; Riversdale, *Stephansen in Stell. Univ. Herb.* 8947.—MOSSEL BAY DIV.: Ataquas Kloof, *Niven* 39; Goliath's Berg, *Muir* 2206; near Reutersbosch, *Salter* 376/17, 2347.

64. **P. plumosa**, Linn., *Sp. Pl.* 195 (1753)! excl. syn. Burm.; *ej. Syst. Nat.* ed. 10, vol. ii, p. 938 (1759); *ej. Sp. Pl.* ed. 2, p. 283 (1762) excl. syn. Burm. et Comm.; *ej. Syst. Nat.* ed. 12, vol. ii, p. 180 (1767); ed. 13, vol. ii, p. 180 (1770); *ej. Mant.* 342 (1771); *ej. Syst. Veg.* ed. 13, p. 196 (1774); ed. 14, p. 235 (1784); *Gaertn., Fruct.* i, 115, tab. 24, fig. 7 (1788) excl. syn. Comm.; *Ait., Hort. Kew.* i, 269 (1789); *Lam., Illus.* ii, 78 (1793) excl. syn. Burm.; *Thunb., Prodr. Cap.* 45 (1794); Linn., *Syst. Veg.* ed. 15, p. 246 (1797); *Willd., Sp. Pl.* i, 1109 (1798) excl. syn.

Comm.; *Thunb., Diss. Phylca* 7 (1804); *Poir. in Lam. Encyl.* v, 290 (1804) excl. syn. Seb.; *Pers., Syn. Pl.* i, 245 (1805); *Du Mont de Cours., Bot. Cult.* ed. 2, vol. vi, 272 (1811); *Ait., Hort. Kew.* ed. 2, vol. ii, p. 20 (1811); *Thunb., Fl. Cap.* 85 (1818); *Roem. et Schultes, Syst. Veg.* v, 483 (1819) excl. syn. Ricinus; *Thunb., Fl. Cap.* ed. 2, p. 203 (1823); *Lam., Planches de Bot. Encycl.* tab. 127, fig. 4 (1823); *Linn., Syst. Veg.* ed. 16, vol. i, p. 828 (1825) excl. syn. omn.; *Brongn. Mem. Rham.* tab. 6, fig. 2 (1826); *in Ann. Sc. Nat.* x, tab. 17, fig. 2 (1827); *Don, Gen. Syst.* ii, 41 (1832); *D. Dietr., Syn. Pl.* i, 876 (1839); *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 379 (1839); *Richter, Syst. Gen. et Sp.* 212 (1840) excl. syn. Comm. et Seb.; *Sond. in Harv. et Sond. Fl. Cap.* i, 487 (1860), incl. vars. *Thunbergiana* et *neglecta*!; *Marloth in Deutschen Tiefsee-Exped.* 1898-99, ii, part 3, p. 119 (1908): [*Chamaelaea africana*—*Pluk. Mant.* 45, tab. 342, fig. 3 (1700): *Phylica foliis linearis-subulatis*, *Roy. Lugd. Bot.* 199 (1740)]: *P. pumila*, *Wendl. ex Willd. Enum. Hort. Berol.* 252 (1809)!; *Roem. et Schultes, Syst. Veg.* v, 489; *Link, Enum. Hort. Berol.* 231 (1821); *Linn., Syst. Veg.* ed. 16, vol. i, p. 828; *DC., Prodr.* ii, 35 (1825); *Don, Gen. Syst.* ii, 41; *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 380: *P. pubescens*, *Lodd., Bot. Cab.* tab. 695 (1822) non *Ait.*; *D. Dietr., Syn., Pl.* i, 876.

A moderately and divaricately branched shrub, about 30 cm. high, with wiry, pubescent branches. Branchlets clothed with a mixture of short and long pubescence which is often of a rusty colour. Leaves closely set, mostly 1—1.5 cm. long: lamina linear-lanceolate, or linear, subcordate or rounded at base, with revolute margins covering a half or more of the lower surface, occasionally open-backed and lanceolate; upper surface with scattered tubercles on the margins and up the midrib or sometimes evenly tubercled over the whole area, pilose with rusty hairs, becoming glabrous, sometimes tardily; petiole much compressed dorsally. Spikes usually 1.5—2.5 cm. long, dense, many-flowered, oblong or rotundate. Bracts foliaceous, slightly longer than the leaves immediately below, erect-spreading or spreading, villous on both sides with grey or buff hairs. Bracteoles 2, minute, linear, dorsally villous. Flowers stipitate, about 5 mm. long: calyx-tube about 2.5 mm. deep, narrowly cyathiform, covered outside with adpressed, retrorse, straight hairs, with a small, annular disc at the base within: sepals 2—2.5 mm. long, deltoid-lanceolate, acute; inner surface flattened on the lower half, angular-convex towards the apex; outer surface covered with adpressed, straight, grey or buff hairs directed towards the apex. Petals inserted at the mouth of the tube, about 1 mm. long: lamina ovate, cordate at base, cucullate, with incurved margins: claw scarcely half as long, cuncate-oblong. Anthers elliptic-oblong, 2-celled. Ovary

obconic, covered with retrorse hairs except upon the base which tapers into a short, glabrous stipe. Style 1·25—1·5 mm. long, columnar, terete. Stigma subulate. Fruit about 5 mm. long, obovate-rotundate, glabrous except for a few scattered hairs upon the upper half, dark reddish brown, with a small calyx-base upon the summit.

**South Africa:** without precise locality, *Oldenburg* 445 in *Brit. Mus. Herb.*, *Thunberg*, *Roxburgh*, *Sonnerat*.

**Cape Province**—CAPE DIV.: north slopes of Table Mt., *Gamble* 22036, *MacOwan* 1828, 2364; west slopes of Lion's Head, *Drege* 6777, 6777a, *Ecklon and Zeyher* 1027 partly, *Pillans* 4850, 6113, 6116, *Thode in Stell. Univ. Herb.* 6169; Kloof, *von Ludwig* 41; elevated places near Cape Town, *Niven* 2; Blinkwater, *Rehmann* 1245; above Bantry Bay, *Smith* 2865, 2874; Camp's Bay, *Moss* 11596; Rosebank, *Bolus* 4020; above Groote Schuur, *Wolley-Dod* 39; Wynberg, *Harvey, Alexander in Kew Herb.*; Cape Flats, *Rehmann* 2021.—MALMESBURY DIV.: near Hopefield, *Bolus* 12641; Waterboers Kraal, *Bachmann* 1469.—CALEDON DIV.: Bot River, *Zeyher* 2212 partly; hills near Caledon, *Pappe*.—TULBAGH DIV.: Tulbagh Road, *Schlechter* 7862, *Rogers* 17088; Saron, *Leipoldt in Bolus Herb.* 18666.—WORCESTER DIV.: near Hex River, *Zeyher* 318.—MONTAGU DIV.: Montagu, *Barnard* 440.—CLAN-WILLIAM DIV.: near Bergvlei, *Drège* 1919.

**Var.  $\beta$ , squarrosa** (*Sond. in Harv. et Sond. Fl. Cap.* i, 487 excl. syn. *pumila* et *pubescens*): **P. squarrosa**, *Vent.*, *Malm.* tab. 57, obs. 3 (1803); *Lodd.*, *Bot. Cab.* tab. 36 (1818); *DC.*, *Prodr.* ii, 36 (1825); *Spreng.*, *Syst. Veg.* iv, pt. 2, p. 108 (1827); *Don*, *Gen. Syst.* ii, 41 (1832): [**Alaternoides africana**—*Comm. Praelud.* 63, tab. 13 (1703): **Ricinus arborescens africanus, tomentosus capitulis**, *Seba, Thes.* i, p. 38, tab. 23, figs. 4, 5 (1734): **P. pubescens**, *Wendl. ex Willd. Enum. Hort. Berol.* 252 (1809) non *Ait.*; *Du Mont de Cours, Bot. Cult.* ed. 2, vi, 272 (1811); *Link.*, *Enum. Hort. Berol.* 231 (1821): **P. Commelini**, *Spreng. in Ges. Naturf. Fr. Berl. Mag.* viii, 104, tab. 8, fig. 6 (1814); *Roem. et Schultes, Syst. Veg.* v, 484 (1819) excl. syn. *strigosa*; *Linn.*, *Syst. Veg.* ed. 16, 1, 828 (1825); *DC.*, *Prodr.* ii, 36; *Don*, *Gen. Syst.* ii, 41 (1832); *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 379 (1839) excl. syn. *pubescens*: **Walpersia squarrosa**, *Presl. Bot. Bemerk.* 38 (1844) absque descr.; plants taller and stems stouter; inflorescence usually much larger, particularly in width, orbicular rather than rotundate; bracts 1·5—1·8 cm. long; flowers 6—8 mm. long; petals about 1·5 mm. long.

**South Africa:** without precise locality, *Thunberg, Sparrman in Bot. Mus. Stockholm, Lichtenstein in Berlin. Herb.* 116, *Krebs in Berlin Herb.* 46, *Bowin* 699.

**Cape Province**—CAPE DIV.: between Diep River and Constantia, *Burchell* 8539; Cape Town, *Hooker* 399; Cape Flats, *Harvey*; Lion's Rump, *Drege* 6778; Raapenberg, *Guthrie* 31; Claremont, *Schlechter* 1059; Smitswinkel Bay, *Phillips*; near Philadelphia, *Pillans* 6181.—MALMESBURY DIV.: near Groenekloof, *Ecklon and Zeyher* 1027 partly; Mamre, *Baur* 1175; between Hopefield and Darling, *Backmann* 1468; south-west base of the Paardeberg, *Pillans* 6167.—STELLENBOSCH DIV.: near Somerset West, *Ecklon and Zeyher* 1026; Kuils River Flats, *Duthie* 812.—CALEDON DIV.: between Bot River and Onrust, *Zeyher* 2212 partly.—TULBAGH DIV.: Roodezand Kloof, *Burchell* 1017.

**Var.  $\gamma$ , horizontalis** (*Sond. in Harv. et Sond. Fl. Cap. i*, 487, excl. syn. Lam): **P. horizontalis**, *Vent.*, *Malm.* tab. 57, obs. 3 (1803); *DC.*, *Prodr.* ii, 35 (1825) excl. syn. Lam.; *Don, Gen. Syst.* ii, 41 (1832); **P. pubescens**, *Lam., Illus.* ii, 78 (1793) excl. syn., non *Ait.*, *Poir. in Lam. Encycl.* v, 290 (1804) excl. syn. omn.; *Lam., Planches Bot.* tab. 127, fig. 2 (1823); **P. plumosa**, *Spreng. in Ges. Naturf. Fr. Berlin. Mag.* viii, 105, tab. 8, fig. 7 (1814) non *Linn.*; plants more branched than in the typical form of the species; leaves acerose, much tapered towards the apex, tubercled over the entire upper surface, ascending; inflorescence smaller than in the preceding variety, tending to be cuneate.

**South Africa**: without precise locality, *Wallich*.

**Cape Province**—TULBAGH DIV.: Tulbagh Kloof, *Drege* 6777b; near Tulbagh Waterfall, *Ecklon and Zeyher* 1028, *Stokoe* 1474, *Mund and Maire in Berlin Herb.*, *Hutchinson* 415; Roodesandberg, *Esterhuysen* 6522; Saron, *Schlechter* 7862, *Leipoldt in Bolus Herb.* 18666a.—PIQUETBERG DIV.: Piquetberg, *Edwards in Bolus Herb.* 18665.

65. **P. nigromontana**, sp. nov. Frutex paulum ramosus circiter 70 cm. altus; ramulis villosis pubescentibusque dense foliatus; foliis linearibus obtusis vel subacutis basi rotundatis supra minute tuberculatis primum villosis, marginibus revolutis; capitulis singulis hemisphaericis; bracteis linearibus; floribus sensim stipitatis extus pilis aureis obtectis; tubo cyathiformi: sepalis ovatis supra carinatis; petalis sub sinibus calycis insertis, lamina ovata obtusa basi subcordata cucullata, ungue brevissimi subquadrato; antheris biloculatis; ovario fusiformi; stylo subulato.

A sparsely branched, rather rigid shrub, about 70 cm. high, with virgate, erect branches. Branchlets villous and densely pubescent. Leaves closely set, 1—1.5 cm. long: lamina erect-spreading, linear, semiterete, obtuse or subacute, rounded at base, somewhat incurved, with closely revolute margins covering the lower surface, obscurely and minutely tubercled and at first villous over the entire upper surface, becoming glabrous: petiole 2—3 mm. long. Capitula solitary, 1—1.5

cm. wide, hemisphaeric, surrounded by many villous leaves reaching to about the summit. Bracts 6—7 mm. long, linear, covered on both sides with long, golden hairs. Bracteoles absent. Flowers distinctly stipitate, 6—6.5 mm. long, covered outside with long, ascending, coarse, golden hairs which are caducous on the lower parts: calyx-tube 1.75—2 mm. deep, cyathiform: sepals 1.5 mm. long, ovate, acute, with a narrow keel up the inner surface. Petals inserted shortly within the mouth of the tube, 1—1.25 mm. long: lamina ovate, obtuse, subcordate at base-concave, incurved at the margins, cucullate at the apex: claw very short, subquadrate. Anthers 1 mm. long, 2-celled: cells elliptic, rounded at both ends. Ovary fusiform. Style 2.5—2.75 mm. long, slender, with a few minute hairs on the upper half. Stigma cylindrical, entire, reaching above the petals. Fruit about 6 mm. long, rotundate, smooth, sparsely villous, pale brown, topped with a small calyx-area.

**South Africa: Cape Province**—PRINCE ALBERT DIV.: Zwartberg, 4,000-5,000 ft., *Pocock* S. 21 (type, in Bolus Herb.), *Stokoe in Bolus Herb.* 22336.

A distinct species in which, however, the petals and anthers show some affinity with *P. imberbis*, Berg.

66. ***P. ericoides***, Linn., *Sp. Pl.* 195 (1753)!; *Kniphof., Orig. Cent.* ii, tab. 833 (1758); Linn., *Syst. Nat.* ed. 10, vol. ii, p. 938 (1759); Linn., *Sp. Pl.* ed. 2, p. 283 (1762); *Bergius, Pl. Cap.* 49 (1767); Linn., *Syst. Nat.* ed. 12, vol. ii, p. 180 (1767); *Burm., Fl. Cap. Prodr.* 6, (1768); *Mill., Dict.* ed. 8 (1768); Linn., *Syst. Nat.* ed. 13, vol. ii, p. 180 (1770); Linn., *Mant.* 342 (1771); Linn., *Syst. Veg.* ed. 13, p. 196 (1774); ed. 14, p. 235 (1784); *Gaertn., Fruct.* i, 114, tab. 24, fig. 7 (1788); *Ait., Hort. Kew.* i, 268 (1789); *Lam., Bot. Illus.* ii, 77 (1793); *Thunb., Prodr. Cap.* 44 (1794); *Curt., Bot. Mag.* tab. 224 (1794); Linn., *Syst. Veg.* ed. 15, p. 246 (1797); *Willd., Sp. Pl.* i, 1108 (1798); *Poir. in Lam. Encycl. Bot.* v, 287 (1804) excl. syn. prae Linn. pro parte: *Thunb., Diss. Phyllica* 4 (1804); *Pers., Syn. Pl.* i, 245 (1805); *Willd., Enum. Hort. Berol.* 252 (1809); *Ait., Hort. Kew.* ed. 2, vol. ii, p. 19 (1811); *Du Mont de Cours., Bot. Cult.* ed. 2, vol. vi, 271 (1811); *Sprengel in Ges. Naturf. Fr. Berlin Mag.* viii, 103, tab. 8, fig. 1 (1814); *Thunb., Fl. Cap.* ed. 2, p. 199 (1823); *Lam., Illus.* tab. 127, fig. 1 (1823); Linn., *Syst. Veg.* ed. 16, vol. 1, p. 827 (1825); *DC., Prodr.* ii, 34 (1825); *Don., Gen. Syst.* ii, 40 (1832); *D. Dietr., Syn. Pl.* i, 874 (1839); *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 380 (1839); Linn., *Sp. Pl.* ed. *Richier* 212 (1840); *Sond. in Harv. et Sond. Fl. Cap.* i, 499 (1860): [***Alaternoides africana ericae foliis floribus albicantibus et muscosis***, *Comm. Hort. Med. Amstel.* ii, 1, tab. 1 (1701); *Boerh., Lugd. Bat.* ii, 214 (1720); *Mill., Dict.* ed. 1, no. 2 (1731); ed. 2 (1733): ***Philyca foliis***

**ovato-linearibus**, *Linn., Hort. Cliff.*, 70, no. 1 (1737) : **Phylica foliis ovato-linearibus**, *Roy., Lugd. Bat.* 199 (1740) ; *Hall., Enum. Pl. Hort. Gotting.* 36 (1753) ; *Zinn, Cat. Pl. Hort. Gotting.* 50 (1757) ; *Fabric., Enum. Meth. Pl. Hort. Helmst.* 128 (1759) ; ed. 2, p. 233 (1763) : **Phylica aethiopica**, *Hill, Eden.* p. 100 tab. 9, fig. 3 (1757)] : **Phylica acerosa**, *Willd., Enum. Hort. Berol.* 252 (1809)! ; *Sprengel. in Ges. Naturf. Fr. Berlin Mag.* viii, 103, tab. 8, fig. 2 ; *Poir. in Lam. Encycl. Suppl.* iv, 401 (1816) ; *Roem. et Schultes., Syst.* v, 478 (1819) ; *Link, Enum.* 230 (1821) ; *Linn., Syst. Veg.* ed. 16, vol. i, p. 827 ; *DC., Prodr.* ii, 34 ; *Don, Gen. Syst.* ii, 40 ; *D. Dietr., Syn. Pl.* i, 874 ; *A. Dietr., in Otto et Dietr. Allg. Gartenz.* vii, 380 : **P. microcephala**, *Willd. ex Roem et Schultes Syst.* v, 491 (1819) ; *DC., Prodr.* ii, 37 ; *Don, Gen. Syst.* ii, 41 ; *D. Dietr., Syn. Pl.* i, 875 : **P. eriophoros**, *Ecklon et Zeyher, Enum.* 132 (1835)! absque descr. ; **Tylanthus eriophorus**, *Presl, Bot. Bemerk.* 38 (1844) absque descr.

A much branched usually compact shrub up to about 60 cm. high. Branchlets slender, with a sparse covering of grey pubescence. Leaves closely set, mostly 5—8 mm. long : lamina erect-spreading, linear or lanceolate-linear, obtuse or subacute, cordate or rounded at base, with closely revolute margins covering the lower surface ; upper surface smooth or wrinkled, occasionally obscurely tubercled on the margins, glabrous or at first pilose on the midrib and margins : petiole 0·5—1 mm. long. Capitula solitary or clustered, 4—7 mm. wide, hemisphaeric, surrounded at base by foliaceous bracts of the outer flowers. Bracts of the inner flowers about 1 mm. long, linear, densely hirsute on the outer surface. Bracteoles 2, similar but smaller. Flowers shortly stipitate, 1·5—2 mm. long : calyx-tube about 0·5 mm. deep, broadly cyathiform, glabrous : sepals 0·75 mm. long, ovate, acute ; inner surface distinctly convex on the upper half ; outer surface with a dense covering of rather coarse, often curly, white hairs. Petals inserted on the upper half of the tube, scarcely 0·5 mm. long : lamina elliptic and incurved-cucullate, or rotundate or orbicular, cucullate, occasionally galeate and with a dorsal ridge : claw about as long, linear or cuneate. Anthers 1-celled. Ovary narrowly obconic, glabrous. Stigma sessile. Fruit about 4 mm. long, obovate, subtrilobed, glabrous, purple-brown, with a small depressed area on the summit.

**South Africa** : without precise locality, *Thunberg, Sparrman, Masson, Thom, Cooper* 3551.

**Cape Province**—CAPE DIV. : Camp's Bay, *Alexander Prior, Berg, Rehmann* 1600 ; Doornhoogte, *Ecklon and Zeyher* 1015 partly ; Cape Flats, *Moss* 4506 ; between Philippi and Strandfontein, *Pillans* 6184 ; near Retreat, *Wolley-Dod* 1203, *Dummer* 1470 ; dunes at Llandudno, *Compton in Bolus Herb.* 18988 ; Chapman's Peak, *Hutchinson* 119,



*Compton* 9358; Wynberg, *Roxburgh*; coast near Simon's Town, *Dummer* 1559 partly; Miller's Point, *Salter* 248/18; mountain slopes near Smitswinkel Bay, *Bolus* 7027; Buffels Bay, *Salter* 248/18A.—STELLENBOSCH DIV.: Kuils River, *Pappe*; Sir Lowry's Pass, *Guthrie and Page*.—CALEDON DIV.: mouth of Steenbras River, *Pillans* 6829; Onrust River, *Schlechter* 10398, Kogel Bay, *Parker* 3501.—BREDASDORP DIV.: dunes near Agulhas, *Ecklon and Zeyher* 1014, *L. Bolus in Bolus Herb.* 20555; Brandfontein, *Schlechter* 10578, *Smith* 3129.—RIVERSDALE DIV.: Still Bay, *Muir* 424.—MOSSEL BAY DIV.: Mossel Bay, *Commander Elliott in S. African Mus. Herb.* 6057.—PORT ELIZABETH DIV.: Port Elizabeth, *Kemsley* 313, *Potts* 308, *Salter* 377/58, *L. Bolus in Bolus Herb.* 21322; near the burying ground at Algoa Bay, *Burchell* 4317; Hume-wood, *Cruden* 346, *Paterson* 1073; Hougham Park, *Paterson* 1092.

**Var.  $\beta$ , montana** (*Pillans*); upper branches and branchlets slender; leaves 5—10 mm. long, with a narrowly linear lamina; petals with a calyptriform lamina.

**Cape Province**—STELLENBOSCH DIV.: Sir Lowry's Pass, *Burchell* 8290, *Schlechter* 7798 (type, in *Bolus Herb.*).

**Var.  $\gamma$ , Zeyheri** (*Pillans*) [*Trichocephalus imberbis*, *Ecklon et Zeyher, Enum.* 132 (1835)! absque descr.: *Tylanthus imberbis*, *Presl, Bot. Bemerk.* 37 (1844) absque descr.; leaf-lamina rounded or subcordate at base, sharply apiculate, more or less tuberculate-scabrid on the margins; flowers 2—2.5 mm. long; petals with a rotundate or orbicular, cucullate lamina.

**Cape Province**—CALEDON DIV.: Zwartberg, *Ecklon and Zeyher* 1010, 1014 partly, *Niven* 26, *Bolus* 9899 (type, in *Bolus Herb.*), *Schlechter* 9769, 10340; mountains between Villiersdorp and Fransch Hoek, *Bolus* 5145; Genadendal, *Zeyher* 439; Viljoen's Pass, *Pillans* 6300; between Viljoen's Pass and Somerset Sneeuwkop, *Stokoe* 3005.

**Var.  $\delta$ , Muirii** (*Pillans*); plants about 35 cm. high, with slender, subadpressedly pubescent branchlets; leaves 3—5 mm. long, with the lamina linear, obtuse, semiterete, smooth or wrinkled on the upper surface; capitula 4—7 mm. wide, occasionally on peduncle-like, sparsely leafy branchlets; petals with an elliptic or rotundate, cucullate lamina.

**Cape Province**—RIVERSDALE DIV.: hills near Riversdale, *Muir* 3086, 4636 (type, in *Bolus Herb.*).

**Var.  $\epsilon$ , pauciflora** (*Pillans*); plants about 40 cm. high; branchlets very slender; leaves about 5 mm. long, the lamina linear, obscurely tubercled on the margins; capitula 2.5—3 mm. wide, 7—12-flowered; flowers 1.5—1.75 mm. long; petals with an elliptic, incurved lamina.

**Cape Province**—BREDASDORP DIV.: Elim, *Schlechter* 7738 (in *Bolus Herb.*).

67. **P. floccosa**, sp. nov. Fruticulus ramosissimus circiter 20 cm. altus; ramulis tomentosis; foliis linearibus paulum truncatis vel obtusis basi cordatis marginibus arte revolutis minute pustulatis; floribus sessilibus extus tomentosis in capitulis hemisphaericis dispositis; tubo late cyathiformi; sepalis ovatis planis; petalis tubo medio insertis, lamina rotundata cucullata, ungue lineari; ovario anguste obconico; stigmatibus subsessilibus.

A much branched, wiry shrublet about 20 cm. high, with slender branchlets clothed with very dense, white tomentum. Leaves closely set, 3–6 mm. long: lamina erect-spreading, somewhat incurved, linear, semiterete, truncate or obtuse, with an apiculus directed inwards, cordate at base; upper surface smooth except for minute pustules on the margins and about the apex where it is at first pilose; petiole about 1 mm. long, densely tomentose. Capitula solitary, about 5 mm. wide, hemisphaeric, 5–8-flowered, subtended by several leaves. Bracts about 3 mm. long, linear-lanceolate, densely villous on the dorsal surface. Bracteoles 2, setaceous, villous. Flowers sessile, about 2.5 mm. long: tube 1 mm. deep, broadly cyathiform, densely covered outside with deciduous, white, woolly hairs: sepals 1 mm. long, ovate, flat and glabrous on the inner surface, with a dense covering of white, woolly hairs on the outer surface. Petals inserted at the middle of the tube, 0.5 mm. long: lamina rotundate, cucullate: claw half as long, linear. Anthers reniform, 1-celled. Ovary narrowly obconic, clothed with caducous, woolly hairs. Stigma on a short, columnar style.

**South Africa: Cape Province**—UNIONDALE DIV.; Mannetjeberg, Kammanassie Range, 5,000-6,000 ft. alt., *Esterhuysen* 4751 (type, in Bolus Herb.), *Bond* 929.

The nearest affinity of this species is doubtful, but it resembles *P. ericoides*, *L.* in the structure of the calyx and petals, though differing in its almost truncate leaves and hairy ovary.

68. **P. floribunda**, sp. nov. Frutex ramosissimus circiter 40 cm. altus; ramulis sparse cano-pubescentibus; foliis lanceolatis apiculatis basi valde cordatis supra laevibus, marginibus arte revolutis; capitulis late hemisphaericis; bracteis lineari-oblongis villosis; floribus subsessilibus; tubo cyathiformi glabro; sepalis ovatis convexis extus cano-tomentosis; petalis sub sinibus calycis insertis, lamina elongatogaleata, ungue subaequilongo lineari; ovario turbinato glabro; stigmatibus sessilibus pulvinatis.

A much branched, wiry shrub, about 40 cm. high. Branchlets slender, sparsely clothed with short, spreading, grey pubescence. Leaves about 5 mm. long: lamina ascending, lanceolate, apiculate and laterally compressed at the apex, widened, and deeply cordate at the base, with

closely revolute margins covering the lower surface; upper surface smooth or wrinkled, often obsoletely tubercled on the margins, sparsely pilose in the undeveloped state: petiole very short. Capitula usually on short branchlets and associated in panicle-like clusters, 5—7 mm. wide, broadly hemisphaeric, involucred by several short leaves and the outer bracts with foliaceous tips. Bracts of the inner flowers 1.5 mm. long, linear-oblong, villous. Bracteoles 2, similar, about as long. Flowers subsessile, 2 mm. long: calyx-tube scarcely 0.75 mm. deep, cyathiform, glabrous: sepals 0.75 mm. long, ovate, acute, rounded-convex on the inner surface, with a dense covering of white tomentum on the outer surface. Petals inserted at the mouth of the tube; lamina elongate-galeate, much compressed laterally: claw slightly longer, linear. Anthers reniform, 1-celled. Ovary turbinate, glabrous. Stigma sessile, pulvinate.

**South Africa: Cape Province**—BREDASDORP DIV.: east side of a hill near Bredasdorp, *Leighton* in Bolus Herb. 20490.

Though closely related to *P. nigrata*, Sond. this species is distinguished by the leaf-lamina being deeply cordate at base, by the smaller capitula and very much smaller flowers.

69. ***P. sericea***, sp. nov. Frutex paulum ramosus circiter 60 cm. altus; ramulis sericeo-pubescentibus; foliis linearibus vel lanceolato-linearibus subacutis basi cordatis minute tuberculato-scabridis, marginibus arte revolutis; capitulis singulis hemisphaericis; bracteis spathulatis extus villosis; floribus breve stipitatis; tubo cyathiformi extus supra medium tomentosum; sepalis ovato-lanceolatis convexis extus dense cano-tomentosis; petalis tubo medio insertis, lamina rotundata vel orbiculata cucullata, ungue cuneato-lineari; ovario turbinato glabro; stigmatibus sessile trilobato.

A moderately branched wiry shrub, about 60 cm. high, with slender branchlets clothed with grey velvety pubescence. Leaves 6—10 mm. long, erect-spreading: lamina linear or lanceolate-linear, subacute, cordate at base, straight, with closely revolute margins covering the lower surface; upper surface minutely tuberculate-scabrid, clothed with subadpressed, grey, silky hairs, at length glabrous: petiole about 0.75 mm. long, pubescent. Capitula solitary, about 8 mm. wide, hemisphaeric, many-flowered, surrounded by leaves consisting in part of a considerably lengthened and widened petiole. Bracts of the outer flowers about 3.5 mm. long, obovate, acuminate, dorsally villous: bracts of the inner flowers about 2.5 mm. long, spathulate, acute, dorsally villous. Bracteoles 2, acicular, densely villous. Flowers shortly stipitate, 2.5—3 mm. long: calyx-tube scarcely 1 mm. deep, cyathiform, tomentose on the upper half of the outer surface: sepals 1 mm. long, ovate-lanceolate, densely clothed with white tomentum on the outer surface, convex

and glabrous on the inner surface. Petals inserted half way up the tube, consisting of a rotundate or orbicular, cucullate lamina and a cuneate-linear claw. Anthers cordate, 1-celled. Ovary turbinate, glabrous. Stigma sessile, trilobed. Fruit 4.5 mm. long, obovate, smooth, chestnut-brown, with a small calyx-area.

**South Africa: Cape Province**—PRINCE ALBERT DIV.: Seven Weeks Poort, *Stokoe* 6486 (type, in Bolus Herb.), 1800.

70. *P. selaginoides*, *Sond. in Harv. et Sond. Fl. Cap.* i, 499 (1860)!

A moderately branched shrub, usually 30—40 cm. high, with wiry branches. Branchlets rather slender, clothed with short, erect-spreading, grey pubescence. Leaves closely set, 3.5—6 mm. long: lamina erect-spreading, almost always somewhat incurved, linear, with a laterally compressed, acute apex, or obtuse, slightly cordate at base, with closely revolute margins covering the lower surface; upper surface smooth, usually pitted and at first pilose on the margins, soon becoming glabrous. Petiole 1—1.5 mm. long. Capitula solitary or on short branchlets and clustered, 0.5—1.2 cm. wide, hemisphaeric, many-flowered, involucrate with many leaves having enlarged petioles. Bracts 1.5—2 mm. long, linear or acicular, covered with long, grey hairs on the outer surface. Bracteoles 2, like the bracts. Flowers stipitate, 2—3.5 mm. long: calyx-tube 0.5—0.75 mm. deep, cyathiform, sparsely clothed outside with coarse, deciduous hairs, lined with an inconspicuous disc: sepals 1.25—1.75 mm. long, ovate-lanceolate, acute, angular-convex on the apical half of the inner surface, overtopped by a dense covering of straight, grey hairs on the outer surface. Petals inserted on the upper half of the tube, scarcely 0.5 mm. long: lamina orbicular, cucullate, with a dorsal ridge: claw as long, cuneate-linear. Anthers 1-celled. Ovary obconic, sparsely villous with long, deciduous, ascending, grey hairs. stigma minute, sessile.

**South Africa: Cape Province**—BREDASDORP DIV.: between Bredasdorp and Elim, the Poort, *Bolus in Bolus Herb.* 19042, *Leighton in Bolus Herb.* 21092, *Bond* 456, *Compton* 4379; Mierkraal, *Schlechter* 10519; Sandhoogte, *Smith* 2993; Cape Agulhas, *Salter* 4116, 4827, *Pillans* 8152; Kathoek, *Pillans* 9379.—SWELLENDAM DIV.: without precise locality, *Ecklon, Zeyher in S. Afr. Mus. Herb.* 15037.

The affinity of this species is with *P. nigrita*, *Sond.* from which it is chiefly distinguished by its differently shaped petals. Owing to the very caducous nature of the hairs upon the calyx-tube, which probably become detached during the flowering period, it usually appears to be glabrous.

71. *P. karroica*, sp. nov. Frutex ramosissimus circiter 40 cm. altus; ramulis cano-pubescentibus dense foliatis; foliis linearibus subacutis basi subcordatis supra rugosis vel laevibus, marginibus arte revolutis;

capitulis plerumque singulis late hemisphaericis ; bracteis linearibus extus villosis ; floribus stipitatis ; tubo late cyathiformi glabro ; sepalis deltoideo-ovatis supra medium convexis extus tomentosis ; petalis sub sinibus calycis insertis, lamina rotundata paulum cucullata, ungue brevi oblongo ; ovario turbinato glabro ; stigmatibus sessilibus.

A much branched, wiry shrub, about 40 cm. high. Branchlets slender, clothed with short subadpressed, grey pubescence. Leaves closely set, 5—8 mm. long : lamina erect-spreading, linear, subacute, usually apiculate, subcordate at base, semiterete, with closely revolute margins covering the lower surface ; upper surface wrinkled or smooth, sparsely covered with grey pubescence, becoming glabrous : petiole 0.5—0.75 mm. long, stout. Capitula mostly solitary, 4—6 mm. wide, broadly hemisphaeric, surrounded by several leaves and leafy bracts. Bracts of the inner flowers about 1.75 mm. long, linear, clothed on the outer surface with long, ascending, white hairs. Bracteoles 2, acicular, villous. Flowers 1.75—2 mm. long, on a short, villous stipe : calyx-tube about 0.5 mm. deep, broadly cyathiform, glabrous : sepals scarcely 1 mm. long, deltoid-ovate, acute, angular-convex on the apical half of the inner surface, with a dense covering of white, woolly hairs on the outer surface. Petals inserted near the mouth of the tube, scarcely 0.5 mm. long : lamina rotundate or elliptic-rotundate, more or less cucullate : claw about half as long, oblong or cuneate. Anthers reniform, 1-celled. Ovary turbinate, glabrous. Stigma sessile, with 3 short lobes. Fruit 5—6 mm. long, obovate-rotundate, deeply furrowed longitudinally, red-brown, with a small calyx-base.

**South Africa : Cape Province**—GEORGE DIV. : Klipdrift, 2,000 ft., *Schlechter* 2258 (type, in Bolus Herb.) ; between Doorn River and Klipdrift, *Fourcade* 3427.—UNIONDALE DIV. : Long Kloof near Avontuur, *Bolus* 2282 ; south side of mountain between Uniondale and Avontuur, *Fourcade* 3348 ; top of old pass between Avontuur and Uniondale, *Fourcade* 2908.—ROBERTSON DIV. : Bushman's River, *Lewis in Bolus Herb.* 22337, *Compton* 5764, 5765.

The affinity is with *P. parviflora*, Berg from which it is distinguished by the absence of tubercles on the leaves and by the presence of pubescence over the entire upper surface of the young leaves.

72. *P. linifolia*, sp. nov. Fruticulus ramosissimus ; ramulis gracilissimis pubescentibus dense foliatis ; foliis anguste linearibus acutis basi rotundatis supra rugulosis vel laevibus, marginibus arte revolutis ; capitulis singulis ; bracteis linearibus villosis ; floribus stipitatis ; tubo cyathiformi glabro ; sepalis ovatis convexis extus tomentosis ; petalis tubo medio insertis, lamina galeata, ungue aequilongo cuneato-oblongo ; ovario turbinato glabro ; stigmatibus sessilibus.

A divaricately branched, low shrub, with wiry branches. Branchlets very slender, clothed with adpressed, grey pubescence. Leaves closely set, 5—9 mm. long : lamina erect-spreading, narrowly linear, acute, often apiculate, rounded at base, semiterete, with closely revolute margins covering the lower surface ; upper surface rugulose or smooth, more or less minutely tubercled on the margins, with adpressed pubescence only while in the juvenile state, soon becoming glabrous : petiole about 1 mm. long. Capitula solitary, 5—7 mm. wide, widely rounded over the upper surface, subtended and much exceeded by a few leaves. Bracts of the outer flowers 2·5—3 mm. long. Bracts of the inner flowers about 2 mm. long, linear, clothed with long, white, silky hairs. Bracteoles 2, similar to the bracts but narrower. Flowers about 2·5 mm. long, on a very short, villous stipe : calyx-tube 0·5 mm. deep, cyathiform, glabrous : sepals 0·5—0·75 mm. long, ovate, acute, rounded-convex on the inner surface, densely tomentose on the outer. Petals inserted half way up the tube, 0·5 mm. long or slightly longer : lamina galeate, crested with a ridge from front to back : claw cuneate-oblong, about as long. Anthers orbicular, 1-celled. Ovary turbinate, glabrous. Stigma sessile. Fruit about 3·5 mm. long, rotundate, light brown, surmounted by a small calyx-base.

**South Africa : Cape Province**—CALEDON DIV. : mountains near Bot River, *Schlechter* 9438 (in *Bolus Herb.*).

The affinity of this species is with *P. disticha*, E. & Z. from which it is distinguished by larger leaves and capitula and by different petals.

73. ***P. nigrita***, *Sond. in Harv. et Sond. Fl. Cap.* i, 498 (1860)! : ***Trichocephalus atratus***, *Ecklon et Zeyher, Enum.* 131 (1835)! excl. syn., absque descr.

A much branched shrub, about 40 cm. high, with wiry branches. Branchlets slender, rather thinly clothed with grey pubescence. Leaves 5—8 mm. long : lamina erect-spreading, linear or lanceolate-linear, semiterete, acute or obtuse, rounded at base, with closely revolute margins covering the lower surface ; upper surface smooth or more or less rough with closely set or scattered fine tubercles, at first scantily pubescent : petiole about 1 mm. long. Capitula 7—10 mm. wide, hemisphaeric, surrounded at base by foliaceous bracts of the outer flowers. Bracts of the inner flowers 3 mm. long, linear, widened upwards into a cuneate apex, densely covered on the dorsal surface with long, white, silky hairs. Bracteoles 2, about 2·5 mm. long, setaceous, similarly villous. Flowers 2·5—3·5 mm. long on a hirsute stipe : calyx-tube 1·5 mm. deep, cyathiform, clothed with coarse, very caducous hairs : sepals 1—1·25 mm. long, ovate-lanceolate, acute, densely covered on the dorsal surface with white, woolly hairs, angular-convex on the inner

surface. Petals 0·5 mm. long, inserted half way up the tube : lamina galeate, laterally compressed, elliptic or oblong as viewed from above, or linear, concave and incurved, obtuse, the anterior edge below the level of the top of the acicular, slightly longer claw. Anthers 1-celled. Ovary very narrowly obovate, clothed with coarse, very caducous hairs. Stigma subsessile, broad, flat-topped.

**South Africa: Cape Province**—CAPE DIV.: mountain slopes near Simon's Town, *Schlechter* 1105.—CALEDON DIV.: Zwartberg, *Ecklon and Zeyher* 1004, *L. Guthrie in Bolus Herb.* 18991; Bot. River, *MacOwan in Herb. Norm. Austr.-Afr.* 208; Hermanus, *Salter* 1203; "Highlands," *Compton* 7343.—BREDASDORF DIV.: Elim, *Schlechter* 7735, *Bolus in Bolus Herb* 19041, *Guthrie* 3859.

Owing to the very caducous nature of the hairs covering the calyx-tube and ovary these usually appear to be glabrous.

74. ***P. pauciflora***, sp. nov. Frutex ramosissimus circiter 50 cm. altus; ramulis minute tomentosis pubescentibusque dense foliatus; foliis lineari-bus obtusis basi subcordatis dense tuberculatis, marginibus arte revolutis; capitulis singulis hemisphaericis paucifloris; bracteis ellipticis utrinque villosis; floribus breve stipitatis; tubo late cyathiformi glabro; sepalis deltoideo-ovatis supra basin convexis extus tomentosis; petalis tubo calycis supra medium insertis, lamina ovata concava supra medium subcucullata, ungue brevi cuneato; ovario turbinato glabro; stigmatibus subsessili pulvinato.

A much branched shrub, about 50 cm. high, with wiry, ascending branches. Branchlets slender, clothed with minute tomentum and short, spreading pubescence. Leaves closely set, 4—5·5 mm. long: lamina ascending or erect-spreading, linear, obtuse, subcordate at base, straight, semiterete, with closely revolute margins covering the lower surface; upper surface closely tubercled, at first softly pubescent, becoming glabrous: petiole 0·5 mm. long. Capitula solitary, about 4 mm. wide, hemisphaeric, few-flowered, surrounded by several leaves and the outer foliaceous bracts. Bracts of the inner flowers about 2·5 mm. long, elliptic, acute, navicular, silky-villous on both sides. Bracteoles 2, about 1·5 mm. long, acicular, dorsally villous. Flowers 2—2·5 mm. long, on a short, villous stipe: calyx-tube 0·75 mm. deep, broadly cyathiform, glabrous, with an inconspicuous disc lining the sides up to the middle: sepals 1 mm. long, deltoid-ovate, acute, flattened at the base, angular-convex above, densely tomentose on the outer surface. Petals inserted on the upper half of the tube, 0·5 mm. long: lamina ovate, acute, concave, subcucullate above the middle: claw about half as long, cuneate. Anthers reniform, 1-celled. Ovary turbinate, glabrous. Stigma subsessile, pulvinate.

**South Africa : Cape Province**—CERES DIV. : “Kat Bakkies,” Stompfontein, Zwart Ruggens, 4,000 ft., *Levy's* 1885 (in Bolus Herb.).

75. ***P. incurvata***, sp. nov. Frutex ramosissimus circiter 30 cm. altus ; ramulis pubescentibus ; foliis ascendentibus incurvis oblongo-lanceolatis obtusis basi cordatis laevibus glabris, marginibus arte revolutis ; capitulis hemisphaericis ; bracteis linearibus extus supra medium dense villosis ; floribus stipitatis extus villosis ; tubo late cyathiformi ; sepalis deltoideo-ovatis supra medium convexis ; petalis sub sinibus calycis insertis, lamina orbiculari cucullata, ungue paulum longiore oblongo-cuneata ; ovario obconico ; stigmatibus sessilibus.

A much branched, wiry shrub, about 30 cm. high. Branchlets slender, silky pubescent. Leaves 2—2.5 mm. long : lamina ascending, distinctly incurved, with the apex touching the stem or leaf above, oblong-lanceolate, obtuse, tipped with a subacute callus, cordate at base, with closely revolute margins covering the lower surface ; upper surface smooth or wrinkled, glabrous except for a deciduous tuft of hairs at the apex : petiole very short. Capitula solitary, 3—5 mm. wide, hemisphaeric, surrounded at base by a few short leaves and outer bracts. Bracts of the inner flowers 1.25—1.5 mm. long, linear, subacute, densely villous on the upper half of the outer surface. Bracteoles 2, shorter, villous. Flowers 1.75—2 mm. long, on a persistently villous stipe : calyx-tube broadly cyathiform, covered outside with ascending, deciduous, grey hairs : sepals scarcely 0.75 mm. long, deltoid-ovate, acute, covered outside with spreading, white hairs, keeled on the upper half of the inner surface. Petals inserted at the mouth of the tube, 0.5 mm. long : lamina orbicular, cucullate : claw oblong-cuneate, slightly longer. Anthers reniform, 1-celled. Ovary obconic, covered with long, ascending, deciduous hairs. Style and stigma together scarcely 0.5 mm. long, columnar.

**South Africa : Cape Province**—BREDASDORP DIV. : Elim, *Schlechter* 7719 (in Bolus Herb.).

Floral characters readily distinguish this species from *P. brevifolia*, E. & Z. which it superficially resembles, and the hairy ovary separates it from *P. parviflora*, Berg with which it probably has nearest affinity.

76. ***P. chionocephala***, *Schltr. in Engl. Bot. Jahrb.* xxvii, 167 (1899)!

A moderately branched shrub about 25 cm. high. Branchlets slender, covered with grey tomentum with which is mingled long silky, straight hairs. Leaves crowded, about 6 mm. long : lamina erect-spreading, frequently somewhat incurved, narrowly linear, subacute, with closely revolute margins covering the lower surface ; upper surface finely tubercled, at first pilose, soon becoming glabrous : petiole about 1 mm. long. Capitula solitary, 7—10 mm. wide, surrounded by foliaceous



bracts 4—5 mm. long. Bracts of the outer flowers about 5 mm. long, ovate-lanceolate, acute, navicular, puberulous on the outer surface, villous on the inner, purplish. Bracts of the inner flowers slightly shorter, linear-lanceolate, villous on both sides. Bracteoles 2, 2·5—3 mm. long, narrowly linear, villous. Flowers 3·5—4 mm. long: calyx-tube 1·5 mm. deep, obconic, glabrous, with an inconspicuous disc at the base: sepals 1·25 mm. long, erect-spreading, lanceolate, acute; outer surface clothed with white hairs up to 1 mm. long; inner surface convex, glabrous. Petals inserted half way up the tube, 0·5 mm. long, oblanceolate or spatulate, acute or obtuse, slightly convex on the inner side, incurved at the apex. Anthers 1-celled. Ovary obconic, glabrous. Style stout, scarcely 0·25 mm. long. Stigma capitate. Fruit about 3·5 mm. long, obovate-rotundate, with 3 longitudinal furrows, brown, shiny, with a small, depressed calyx-area.

**South Africa: Cape Province**—CERES DIV.: Cold Bokkeveld, *Schlechter* 8901; Baviaansberg, *Stokoe* 6510.

77 ***P. parviflora*, Berg., *Descr. Pl. Cap.* 48 (1767)!**; *Linn., Mant. altera* 209 (1771); *Linn., Syst. Veg.* ed. 13, p. 196 (1774); ed. 14, p. 235 (1784); *Lam., Illus.* ii, 78 (1793); *Thunb., Prodr.* 44 (1794); *Linn., Syst. Veg.* ed. 15, p. 246 (1797); *Willd., Sp. Pl.* 1113 (1798); *Thunb., Diss. Phyllica* 4 (1804); *Poir. in Lam. Encycl. Bot.* v, 287 (1804); *Pers., Syn. Pl.* i, 245 (1805); *Thunb., Fl. Cap.* 78 (1818); *Wendl., Collect.* band iii, p. 15, tab. 80 (1819); *Roem. et Schultes, Syst. Veg.* v, 478 (1819); *Thunb., Fl. Cap.* ed. 2, p. 199 (1823); *Linn., Syst. Veg.* ed. 16, i, p. 827 (1825); *DC., Prodr.* ii, 34 (1825); *Don. Gen. Syst.* ii, 40 (1832); *D. Dietr., Syn. Pl.* i, 874 (1839); *Richter, Syst. Gen. et Sp.* 212 (1840); *D. Dietr., Fl. Univ. N. Folge* tab. 51 (1849); *Sond. in Harv. et Sond. Fl. Cap.* i, 499 (1860): ***P. australis*, Link, *Enum. Hort. Berol.* i, 230 (1821); *DC., Prodr.* ii, 35; *Don, Gen. Syst.* ii, 41; *Steud., Nomen.* ed. 2, pars iii, p. 325 (1841) absque descr.:** ***P. acerosa*, Sieber ex Presl *Bot. Bemerk.* 39 (1844)!** ***Tylanthus parviflorus*, Presl, *Bot. Bemerk.* 38 absque descr.**

A much branched, usually compact shrub, about 40 cm. high, with wiry branches. Branchlets slender, thinly covered with very short tomentum with which are mingled straight, silky hairs. Leaves usually closely set, 4—5 mm. long, sometimes up to 7 mm.: lamina lanceolate or ovate-lanceolate, acute, subcordate at base, almost always slightly incurved, with revolute margins converging the lower surface, or sometimes with the lower surface for the most part exposed; upper surface smooth or only so up the middle, tubercled on the margins, at first pubescent on the tubercled portions: petiole minute. Capitula 3—4 mm. wide, widely rounded or almost flat above, usually 5—8 flowered, very numerous, at the ends of short, sometimes leafless branchlets and

very often grouped in panicles. Bracts of the outer flowers partly foliaceous. Bracts of the inner flowers about 1.25 mm. long, oblong, acute, villous on the dorsal surface. Bracteoles 2, similar but linear or subulate. Flowers 1.5—1.75 mm. long, shortly stipitate: calyx-tube scarcely 0.5 mm. deep, broadly cyathiform, glabrous, or sparingly pilose on the upper half of the outer surface, with a disc lining the base: sepals 0.5—0.75 mm. long, deltoid-ovate, acute, convex on the upper half of the inner surface, with a dense covering of long, straight, white hairs on the outer surface. Petals inserted at or shortly within the mouth of the tube, 0.25 or scarcely 0.5 mm. long: lamina orbicular, cucullate, slightly keeled on the upper half of the back: claw about as long, linear-cuneate. Anthers 1-celled. Ovary obconic, glabrous. Stigma sessile, 3-humped. Fruit about 4 mm. long, obovate-rotundate, somewhat wrinkled, blackish.

**South Africa:** without precise locality, *Oldenburg* 318 in *Brit. Mus. Herb.*, *Grubb*, *Thunberg*, *Sparman*, *Masson*, *Mund*, *Drege* 1916, *Ecklon* 634, *Ecklon and Zeyher* 1015, *Reynaud*, *Brossard*, *Boivin* 700, *Sieber* 68 partly, 89, 183, *Alexander*.

**Cape Div.:** Cape Flats, *Burchell* 8348; flats near Wynberg, *MacOwan* in *Herb. Norm. Austr.-Afr.* 593; flats near Rondebosch, *Bolus* 3267; Durbanville hills, *Guthrie* 2397; north end of Princess Vlei, *Pillans* 6111; near Retreat Station, *Wolley-Dod* 2605; Nyge Kraal, *Wolley-Dod* 985; Lakeside, *Moss and Rogers* 1621; flats near Tygerberg, *Moss* 9057; Hout Bay, *Harvey* 208, *Thode* 6168; lower plateau on Table Mt., *Bolus* 4523; Muizenberg, *Wolley-Dod* 1013; Kalk Bay Mt., *Pappe* in *S.A. Mus. Herb.* 15065; Elsje's Peak, *Pillans* 4488; Slang Kop, *Pillans* 6183; flats near False Bay, *Schlechter* 426; Miller's Point, *Salter* 248/19; Simon's Town, *C. Wright*; between Miller's Point and Smitswinkel, *Wolley-Dod* 2619; Cape Point, *Schlechter* 7314.—MALMESBURY DIV.: near Mamre, *Ecklon*, *Bolus* 4264; Hopefield, *Bolus* 12643, *Bachmann* 1467, 2135, *Penfold* 251, 252; near Saldanha Bay and Groot Post, *Ecklon and Zeyher* 1020.—PAARL DIV.: near the half-way house, *Paarl*, *Alexander Prior* in *Kew Herb.*—STELLENBOSCH DIV.: between Cape Town and Stellenbosch, *Drege*.—CALEDON DIV.: Houw Hoek, *MacOwan* 1708; Hermanus, *Guthrie* 4128; Hawston, *Schlechter* 9462; Hangklip, *Pillans* 8279.—BREDASDORP DIV.: Mierkraal, *Schlechter* 10535; Elim, *Schlechter* 7699; Wagenhuis Kraal, *Marcus Bay, Fry* in *Galpin Herb.* 4956.—MOSSSEL BAY DIV.: Mossel Bay, *Moran* 51, in *S.A. Mus. Herb.* 9073, *Potts* in *S. A. Mus Herb.* 30938, *Walgate* 210; Cloete's Pass, *Muir* 2198.—RIVERSDALE DIV.: Zandhoogte, *Muir* 422, 637, 4620, 4631; Riversdale, *Muir*, 4632, *Rust* 60, 441.—KNYSNA DIV.: Knysna, *Bowie* 4.

78. **P. parvula**, sp. nov. Fruticulus ramosissimus; ramulis gracilissi-

mis sparse pubescentibus dense foliatis; foliis ovatis acutis basi valde cordatis minute scabridis, marginibus arte revolutis; capitulis singulis depresso-hemisphaericis; bracteis oblongis intus villosis; floribus sessilibus; tubo late cyathiformi glabro; sepalis deltoideo-ovatis supra medium convexis extus dense villosis; petalis sub sinibus calycis insertis, lamina rotundata cucullata, ungue subaequilongo cuneato-oblongo; ovario anguste obconico glabro; stigmatibus subsessilibus pulvinatis.

A much branched, dwarf shrub, about 20 cm. high, with slender, ascending branches. Branchlets very slender, very sparsely pubescent. Leaves closely set, subimbricate, 1.5—2 mm. long: lamina ascending or erect-spreading, ovate, acute, deeply cordate at base, dorsally compressed, acute at the sides, with closely revolute margins covering the lower surface; upper surface minutely scabrid, at first pilose about the apex and on the upper margins, soon becoming glabrous: petiole very short, hidden. Capitula solitary, 3—4 mm. wide, few-flowered, depressed-hemisphaeric, surrounded at base by a few short leaves and foliaceous bracts. Bracts of the inner flowers 1.5 mm. long, oblong, acute, villous on the inner surface. Bracteoles 2, shorter, acicular, dorsally villous. Flowers sessile, 1.5 mm. long: calyx-tube widely cyathiform, glabrous: sepals 0.5 mm. long, deltoid-ovate, acute, flattened in the lower half, rounded-convex in the upper, densely villous on the outer surface. Petals inserted at the mouth of the tube, 0.25 mm. long: lamina rotundate, cucullate: claw about as long, cuneate-oblong. Anthers reniform, 1-celled. Ovary tubular-obconic, glabrous. Stigma subsessile, pulvinate.

**South Africa: Cape Province**—BREDASDORP DIV.: hills at Vogel Vlei, alt. 250 ft., *Schlechter* 10493 (in *Bolus Herb.*).

The affinity of this species is with *P. parviflora*, Berg. from which it is distinguished by much smaller, more cordate leaves.

79. *P. acmaephylla*, *Ecklon et Zeyher, Enum.* 133 (1835)!; *D. Dietr., Syn. Pl. i*, 874 (1839); *Sond. in Harv. et Sond. Fl. Cap.* 495 (1860).

A much branched shrub about 50 cm. high. Branchlets slender, covered with silky, grey pubescence. Leaves 5—8 mm. long: lamina erect-spreading, slightly incurved, lanceolate, acute, mucronulate, cordate at base, with revolute margins covering most of the lower surface; upper surface closely tubercled, at first pubescent, becoming glabrous or almost so: petiole about 0.75 mm. long, pubescent. Capitula usually solitary, 3—6 mm. wide, hemisphaeric, surrounded at base by several leaves and foliaceous bracts. Bracts of the inner series about 1.5 mm. long, oblong, acute, villous on the dorsal surface. Bracteoles 2, linear, dorsally villous. Flowers about 2 mm. long, on a short villous stipe: calyx-tube about 0.5 mm. deep, broadly cyathiform, with an

inconspicuous disc, glabrous except for the villous upper margin of the outer surface: sepals 0.5—0.75 mm. long, erect-spreading, deltoid-ovate, acute, with white tomentum on the outer surface; inner surface flattened at the base, prominently angular-convex upwards, glabrous. Petals inserted half-way up the tube, scarcely 0.5 mm. long: lamina cucullate, orbicular; claw longer, linear, slightly widened upwards. Anthers 1-celled. Ovary obconic, glabrous. Stigma subsessile, trigonous. Fruit about 2 mm. long, obovate-rotundate, wrinkled, chestnut-brown.

**South Africa:** without precise locality, *Drège* 6756, *Baron von Ludwig* in *Bot. Mus., Stockholm*.

**Cape Province**—TULBAGH DIV.: mountains near Tulbagh Waterfall, *Ecklon and Zeyher* 1019, *Pillans* in *Bolus. Herb.* 18496; mountains about Tulbagh Kloof, *Bolus* 7470.—WORCESTER DIV.: Brandvlei Berg, *Esterhuysen* 1918.

80. *P. diffusa*, sp. nov. Fruticulus diffusus: ramulis gracilibus minute pubescentibus; foliis ovatis vel ovato-lanceolatis basi cordatis apice incurvis minute scabridis, marginibus revolutis; capitulis late hemisphaericis; bracteis linearibus extus villosis; floribus stipitatis; tubo late cyathiformi glabro; sepalis ovatis supra medium convexis extus niveo-villosis; petalis tubo medio insertis, lamina rotundata cucullata, ungue oblongo lamina paulum excedente; ovario turbiniformi glabro; stigmatibus subsessilibus.

A dwarf, diffuse shrub, with slender branches. Branchlets very slender, minutely pubescent. Leaves rather distantly placed, about 6 mm. long: lamina spreading or deflexed, ovate or ovate-lanceolate, with an incurved, mucronulate apex, cordate at base, with revolute margins covering a half or less of the lower surface; upper surface widely convex, furrowed at the base, minutely scabrid, obsolete tubercled and at first shortly pilose on the margins, soon becoming glabrous: petiole 1—1.5 mm. long. Capitula 5—8 mm. wide, solitary at the ends of short branchlets and usually associated in lax panicles, widely hemisphaeric, subtended by 1 or 2 short leaves. Bracts of the inner flowers about 1.5 mm. long, linear, villous on the outer surface. Bracteoles 2, similar, acicular. Flowers 2—2.5 mm. long, on a villous stipe: calyx-tube broadly cyathiform, glabrous: sepals 0.75 mm. long, ovate, acute; inner surface angular-convex on the upper half; outer surface with a dense covering of slightly wavy, white hairs. Petals inserted half way up the tube, 0.5 mm. long: lamina rotundate, cucullate: claw slightly longer, oblong. Anthers reniform, 1-celled. Ovary turbinate, glabrous. Stigma subsessile, with 3 obtuse lobes.

**South Africa:** Cape Province—CALEDON DIV.: River Zonder End mountains, alt. about 2,000 ft., *Stokoe* 2150 (type, in *Bolus Herb.*).—

BREDASDORP DIV.: Elim, *Bodkin in Guthrie Herb.* 3860.—MONTAGU DIV.: Keur Kloof, *Bond* 777.

**Var.  $\beta$ , *Burchellii***, leaves closely set, 6—10 mm. long, with a linear-lanceolate or lanceolate lamina only partly exposed in the lower half of the lower surface; petals with an orbicular lamina and cuneate claw about half as long; fruit rotundate, about 5 mm. long, blackish, surmounted by a small calyx-base.

**South Africa:** without precise locality, *Drège* 6761.—CALEDON DIV.: mountains at Genadendal, *Burchell* 7652, *Schlechter* 10292 (type, in *Bolus Herb.*).

The affinity of this species is chiefly with *P. acmaephylla*, E. & Z. from which it differs in habit of growth and in the leaves.

Sl. ***P. anomala***, sp. nov. Frutex ramosissimus circiter 40 cm. altus; ramulis puberulis dense foliatis; foliis lanceolatis vel ovato-lanceolatis mucronulatis basi cordatis supra laevibus, marginibus minute tuberculatis arte revolutis; capitulis hemisphaericis; bracteis linearibus extus villosis; floribus stipitatis; tubo late cyathiformi glabro; sepalis ovatis acutis paulum convexis extus villosis; petalis sub tubo medio insertis, lamina galeata, ungue subaequilongo lineari; ovario anguste turbiniforme glabro; stignate subsessili.

An intricately branched shrub, about 40 cm. high, with wiry or slender branches. Branchlets very slender, sparsely clothed with short, grey, adpressed pubescence. Leaves closely set, 1.75—2.5 mm. long: lamina erect-spreading, lanceolate or ovate-lanceolate, tipped with an acute callus, cordate at base, with revolute margins covering the lower surface; upper surface smooth or wrinkled, minutely tubercled and at first pubescent on the sides and about the apex: petiole very short. Capitula 3—4 mm. wide, flattened across the top, subtended by several leaves. Bracts of the outer flowers about 2 mm. long, subquadrate in the lower half, foliaceous in the upper. Bracts of the inner flowers about 1.5 mm. long, linear, villous on the outer surface. Bracteoles 2, almost as long as the inner bracts, acicular, villous. Flowers stipitate, 1.5—1.75 mm. long: calyx-tube broadly cyathiform, glabrous: sepals 0.5 mm. long or slightly less in length, ovate, acute, villous on the outer surface, slightly rounded-convex on the upper half of the inner. Petals inserted on the lower half of the tube, 0.5 mm. long: lamina galeate, obtuse at the apex: anterior margin widely emarginate or straight, on a level with the upper end of the claw: claw about as long, linear. Anthers 1-celled. Ovary narrowly turbinate, glabrous. Stigma subsessile, pulvinate.

**South Africa: Cape Province**—CALEDON DIV.: hills near Caledon, *Bolus in Bolus Herb.* 19114.

The closest affinity of this species is uncertain. It has some of the characters of *P. parviflora*, Berg, *P. acmaephylla*, E. & Z. and *P. disticha*, E. & Z.

82. ***P. disticha***, Ecklon and Zeyher, *Enum.* 133 (1835)!; *D. Dietr.*, *Syn. Pl.* i, 874 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 500 (1860); ***P. empetroides***, Ecklon and Zeyher l.c. pro parte; *D. Dietr.* l.c.: ***Tylanthus distichus***, Presl, *Bot. Bemerk.* 38 (1844) absque descr.: ***T. empetroides***, Presl. l.c. absque descr.

A shrub, 30—60 cm. high, with wiry branches. Branchlets very slender, reddish, sparsely pubescent with minute, adpressed, grey hairs. Leaves often widely spaced, 4—6 mm. long: lamina linear or lanceolate-linear, acute or subobtuse, rounded at base, with closely revolute margins covering the lower surface, erect-spreading; upper surface rounded, smooth or wrinkled, at first thinly pubescent on the margins: petiole about 0.75 mm. long. Capitula usually solitary, 4—5 mm. wide, surrounded by the wide bracts of the outer flowers, flattened above. Bracts of the inner flowers about 1.25 mm. long, linear, with a dense covering of white, silky hairs on the outer surface. Bracteoles 2, similar but smaller. Flowers 2 mm. long: calyx-tube scarcely 0.5 mm. deep, cyathiform, glabrous on both sides: sepals 0.75 mm. long, deltoid-ovate, acute, sharply convex on the upper half, with a dense covering of woolly, white hairs on the outer surface. Petals inserted on the lower half of the tube, 0.5 mm. long: lamina calyptriform, slightly recurved in the upper half: claw narrowly linear, about as long. Anthers 1-celled. Ovary narrowly turbinate, glabrous. Style together with the rounded, entire stigma 0.25 mm. high. Fruit about 3 mm. long, obconic, obtusely 3-angled, 3-humped above, with a small depressed area, glabrous, purple-brown.

**South Africa: Cape Province**—CAPE DIV.: mountains near Simon's Town, *Schlechter* 1071.—CALEDON DIV.: Houw Hoek, *Zeyher* 2216 partly, *Ecklon and Zeyher* 1021 partly, *Schlechter* 7334, *Gillett* 673, *Salter* 5129; Zwartberg, *G. Guthrie in Bolus Herb.* 19100; Zwartberg and Babylons Tower, *Ecklon and Zeyher* 1022; Onrust River Mt. *Esterhuysen* 4910; Hawston Mt., *Compton* 10181.

**Var.  $\beta$ , cuneata** (*Pillans*): leaves 4—8 mm. long, the lamina minutely tubercled on the margins; petals consisting of a galeate lamina and an oblong-cuneate claw.

**Cape Province**—CALEDON DIV.: Shaw's Mountain, *Stokoe* 6487 (in *Bolus Herb.*).

83. ***P. Mairei***, sp. nov. Frutex paulum ramosus circiter 40 cm. altus; ramulis tomentosis; foliis lanceolatis incurvo-apiculatis basi sensim cordatis supra minute scabridis, marginibus arte revolutis; capitulis

depresso-hemisphaericis; bracteis linearibus extus villosis: floribus stipitatis; tubo late cyathiformi glabro; sepalis ovato-lanceolatis convexis extus dense tomentosus; petalis tubo medio insertis, lamina obovata, rotundata vel orbiculari cucullata, ungue vix aequilongo; ovario obconico glabro; stigmatе sessili trilobato.

A moderately branched shrub, about 40 cm. high, with ascending wiry branches. Branchlets slender, clothed with short tomentum. Leaves 4—5 mm. long: lamina ascending, slightly incurved, lanceolate, with an incurved apiculus, deeply cordate at base, with closely revolute margins covering the lower surface except at the base; upper surface minutely scabrid, sparingly tubercled and at first pilose on the margins, becoming glabrous: petiole 0.75—1 mm. long. Capitula usually solitary, 4—5 mm. wide, depressed-hemisphaeric, many-flowered, subtended by several short leaves. Bracts and bracteoles of the inner flowers similar, 1—1.5 mm. long, linear, villous on the outer surface. Flowers 2—2.25 mm. long, on a short villous stipe; calyx-tube broadly cyathiform, glabrous: sepals 0.75 mm. long, ovate-lanceolate, acute, densely tomentose on the outer surface, rounded-convex on the inner. Petals inserted about the middle of the tube, scarcely 0.5 mm. long: lamina obovate, rotundate, obtuse, deeply concave, cucullate: claw cuneate-oblong, scarcely as long. Anthers reniform, 1-celled. Ovary obconic, glabrous. Stigma sessile, divided into 3 obtuse lobes.

**South Africa: Cape Province**—? BREDASDORP DIV.: mountains at Long Vlei, *Mund and Maire* (type, in Bolus Herb.).—ROBERTSON DIV.: near Montagu, Keur Kloof, *Lewis in Bolus Herb.* 22384.—SWELLEN-DAM DIV.: Tradouw Pass, *Compton* 8570.

The affinity is with *P. acmaephylla*, E. & Z. from which it differs by a different leaf-surface and different petals.

84. ***P. stenopetala***, *Schltr. in Engl. Bot. Jahrb.* xxvii, 169 (1899)!

A much branched shrub, up to 60 cm. high, stout below, with wiry branches. Branchlets slender, clothed with ascending, grey hairs. Leaves crowded, 3—7 mm. long: lamina erect-spreading or spreading, lanceolate-linear, acute, cordate at base, with closely revolute margins covering the lower surface or almost so; upper surface, smooth or slightly rugulose, often pitted on the margins, at first pilose on the margins and midrib: petiole about 0.5 mm. long. Capitula mostly on short branchlets, 3—5 mm. wide, hemisphaeric, often flattened above, with an inconspicuous involucre composed of several leaves and the outer bracts. Bracts of the inner flowers 1.5 mm. long, linear, acute, densely villous on the dorsal surface. Bracteoles 2, setaceous, villous. Flowers 1.75—2.5 mm. long: calyx-tube 0.5 mm. deep, obconic, glabrous on both sides: sepals ovate-acute, 0.75 mm. long, villous on the outer

surface. Petals inserted at the mouth of the tube, 0·5 mm. long, acicular or setaceous, acute, convex in the upper half, incurved. Anthers 1-celled. Ovary obconic, glabrous. Stigma subsessile, capitate.

**South Africa: Cape Province**—TULBAGH DIV.: Piquetberg Road (Gouda), *Schlechter* 7840.

**Var.  $\beta$ , Sieberi** (*Pillans* var. nov.): capitula more distinctly involucrate; petals often absent; ovary often sparsely villous on the upper half or at the middle.

**South Africa:** without precise locality. *Sieber* 68 partly, in *Kew Herb. and Bot. Mus. Stockholm*.

85. **P. alba**, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis cano-pubescentibus; foliis lineari-lanceolatis obtusis basi cordatis supra minute scabridis, marginibus revolutis; capitulis hemisphaericis; bracteis linearibus extus villosis; floribus subsessilibus; tubo urceolato glabro: sepalis ovato-lanceolatis convexis extus tomentosis; petalis tubo calycis supra medium insertis, lamina orbiculari cucullata, ungue subaequilongo cuneato-oblongo; ovario obconico glabro; stylo brevissimo.

A much branched shrub about 60 cm. high with ascending, wiry branches. Branchlets slender, clothed with spreading, grey pubescence. Leaves 5—7 mm. long, erect-spreading: lamina linear-lanceolate, obtuse or callus-acute, cordate at base, slightly incurved, with revolute margins almost covering the lower surface; upper surface minutely scabrid, obscurely and sparsely tubercled on the margins, at first pilose on the margins and about the apex: petiole 0·5—1 mm. long. Capitula 5—8 mm. wide, hemisphaeric, many-flowered, solitary or clustered, subtended by several leaves and leafy bracts. Bracts of the inner flowers 2—2·5 mm. long, linear, dorsally villous. Bracteoles about as long, acicular, villous. Flowers subsessile, 2·5—3·5 mm. long: calyx-tube 0·75—1 mm. deep, urceolate, glabrous: sepals 1·25—1·5 mm. long, ovate-lanceolate, acute, densely white-tomentose on the outer surface; inner surface rounded-convex except at the base, glabrous. Petals inserted shortly above the middle of the tube, 0·5 mm. long: lamina orbicular, cucullate: claw scarcely as long, cuneate-oblong. Anthers reniform, 1-celled. Ovary obconic, glabrous. Style together with the stigma 0·5 mm. long.

**South Africa: Cape Province**—SWELLENDAM DIV.: Tradouw Pass, *Stokoe* in *Bolus Herb.* 21331.—UNIONDALE DIV.: Lauterwater, *Compton* 4240 (type, in *Bolus Herb.*); hills from Misgund to Spitzkop, *Fourcade* 4246.

This species superficially resembles *P. ericoides*, L. to which it is closely related, but is distinguished by its larger flowers with differently shaped sepals.



86. *P. alpina*, *Ecklon et Zeyher, Enum. 133 (1835)! D. Dietr., Syn. Pl. i, 874 (1839).*

A low shrub with ascending, slender branches covered with rather long, spreading, grey pubescence. Leaves 5—6 mm. long: the lamina lanceolate, acute, cordate at base, erect-spreading, slightly incurved, with revolute margins covering about half of the tomentose lower surface; upper surface conspicuously tubercled, shining: the tubercles at first tipped with soft, grey hairs: petiole about 0.5 mm. long, pubescent. Capitula 5—8 mm. wide, hemisphaeric, subtended by a few, short, modified leaves. Bracts of the outer series 3 mm. long, broadly cuneate and pubescent in the lower half, leaf-like in the upper: inner bracts 2.5 mm. long, linear, covered with ascending, straight hairs. Bracteoles 2, 1.5 mm. long, setaceous, similarly pubescent. Flowers 2—2.5 mm. long: tube 0.5 mm. deep, cyathiform, with an inconspicuous disc lining the base, glabrous except round the outside of the mouth: sepals 0.75 mm. long, erect-spreading, ovate-lanceolate, acute; the inner surface convex, prominent on the upper half, glabrous: outer surface densely covered with long, ascending, white hairs. Petals inserted shortly below the mouth of the tube or lower in the upper half, scarcely 0.5 mm. long: lamina obovate, cucullate, narrowed at base into a short, cuneate claw. Anthers reniform, 1-celled. Ovary turbinate, glabrous, surrounded at base by hairs of the stipe. Style together with the stigma broadly conical, reaching almost to the anthers.

**South Africa: Cape Province**—CLANWILLIAM DIV.: mountains near Brakfontein, *Ecklon and Zeyher 1018.*

87. *P. subulifolia*, sp. nov. Frutex ramosissimus circiter 50 cm. altus; ramulis tomentosus; foliis subulatis basi valde cordatis supra pustulatis pilosisque demum glabris: capitulis hemisphaericis; floribus sessilibus; tubo cyathiformi glabro; sepalis ovatis acutis supra medium convexis extus tomentosus: petalis tubo medio insertis, lamina rotundata cucullata, ungue brevi cuneato: ovario obconico glabro: stigmatibus subsessilibus.

A much branched wiry shrub about 50 cm. high. Branchlets slender, clothed with short, grey tomentum. Leaves closely set, 3—5 mm. long: lamina subulate, deeply cordate and distinctly widest at base, with the revolute margins completely covering the lower surface, pustulate and, at first, pilose over the entire upper surface, at length glabrous: petiole short, almost hidden. Capitula solitary, about 5 mm. wide, hemisphaeric, subtended by several leaves with enlarged petioles. Bracts about 3 mm. long, linear-lanceolate, dorsally villous. Bracteoles 2, about 2 mm. long, linear. Flowers sessile, about 2.75 mm. long: tube 0.75 mm. deep, cyathiform, glabrous: sepals 1 mm. long, ovate, acutely

convex on the upper half, otherwise flat, densely clothed with white, woolly hairs on the outer surface. Petals inserted at the middle of the tube, 0.75 mm. long; lamina rotundate, cucullate; claw half as long, cuneate. Anthers reniform, 1-celled. Ovary obovate, glabrous. Stigma shortly 3-lobed, on a trigonous style scarcely 0.5 mm. long. Fruit about 4 mm. long, rotundate, with 3 longitudinal furrows, glabrous, surmounted by a narrow calyx-base.

**South Africa: Cape Province**—WORCESTER DIV.: Audensberg, 5,000 ft. alt., *Esterhuysen* 3214 (in Bolus Herb.).

The affinity of this species is with *P. callosa*, L.f. from which it differs in several important characters of leaf and calyx.

88. ***P. callosa***, *Linn. f. Suppl. Pl.* 153 (1781)!; *Linn., Syst. Veg.* ed. 14, p. 235 (1788); *Ait., Hort. Kew.* ed. 1, p. 269 (1789); *Thunb., Prodr. Cap.* 45 (1794); *Linn., Syst. Veg.* ed. 15, p. 246 (1797); *Willd., Sp. Pl.* i, 1112 (1798); *Thunb., Diss. Phyllica* 9 (1804); *Pers., Syn. Pl.* i, 245 (1805) excl. syn. Lam.; *Ait., Hort. Kew.* ed. 2, ii, 21 (1811); *Thunb., Fl. Cap.* 88 (1818); *Roem. et Schultes., Syst. Veg.* v, 488 (1819) excl. syn. *P. reflexa*; *Link., Enum. Hort. Berol.* 231 (1821); *Thunb., Fl. Cap.* ed. 2, p. 204 (1823); *Linn., Syst. Veg.* ed. 16, i, 828 (1825); *DC., Prodr.* ii, 36 (1825) excl. syn. Lam.; *D. Dietr., Syn. Pl.* i, 875 (1839); *Sond., in Harv. et Sond. Fl. Cap.* i, 494 (1860): ***Trichocephalus callosus***, *Eckl. et Zeyher, Enum.* 130 (1835); ***Phyllica atrata***, *Bernh. ex Krauss in Flora* xxvii, 347 (1844) non Licht.; *Krauss, Beitr.* 45 (1846): ***Tylanthus callosus***, *Presl, Bot. Bemerk.* 38 (1844) absque descr.

A wiry, much branched shrub, usually 60—120 cm. high. Branchlets clothed with grey tomentum with which is interspersed longer, silky hairs. Leaves crowded, 5—15 mm. long: lamina erect spreading to declinate, lanceolate or ovate-lanceolate, acute, apiculate, cordate at base, with revolute margins covering about half, more or less, of the lower surface; upper surface conspicuously tubercled on the sides, the midrib and about the apex, or with tubercles sparsely to densely scattered over the entire upper surface, with caducous, grey hairs on the tubercled parts: petiole 0.5—1.75 mm. long. Capitula solitary or rarely clustered, 5—10 mm. wide, hemisphaeric, surrounded at base by modified leaves and foliaceous bracts of the outer flowers. Bracts of the inner flowers 2.5—3.5 mm. long, linear-oblong, dorsally villous. Bracteoles 2, slightly shorter, linear, dorsally villous. Flowers 3—4 mm. long, subsessile: calyx-tube 0.75 mm. deep, cyathiform, entirely glabrous, with a disc at the base within: sepals 1—2 mm. long, erect-spreading, ovate-lanceolate, acute; outer surface clothed with long, white hairs; inner surface convex, glabrous. Petals inserted near the mouth of the tube, 0.5—0.75 mm. long: lamina rotundate, obovate, ovate or elliptic-

ovate, rounded or subacute at apex, incurved-cucullate, often laterally compressed: claw slightly shorter to slightly longer, cuneate-linear or linear. Anthers 1-celled. Ovary turbinate, glabrous. Style wide and very short, with 3 small stigmatic lobes. Fruit about 5 mm. long, obovate-rotundate, wrinkled, glabrous, blackish, with 3 longitudinal furrows.

**South Africa:** without precise locality, *Thunberg, Drège* 9534.

**Cape Province**—CAPE DIV.: north-west side of Table Mt., *Drège* 1917, 1917a, 1917b; Table Mt., *Berg. in Berlin Herb., Phillips* 198, *Pillans* 4318; Orange Kloof, *Salter* 248/14; slopes between Hout Bay and Chapman's Peak, *Pillans* 6119; west slopes of Chapman's Peak, *Pillans* 9024; Oude Kraal, *Pappe*; upper part of Kasteel Poort, *Pillans* 4318, 6120; Blinkwater Gorge, *Moss* 8213, *Pillans* 4639, 4728.—MALMESBURY DIV.: hills near Mamre, *Ecklon and Zeyher* 998; Paardeberg, *Pillans* 5782, 6169, 6319, 7651.—STELLENBOSCH DIV.: lower slopes of Stellenbosch Mt., *Garside in Stell. Univ. Herb.* 1038.—PAARL DIV.: near Paarl, *Burchell* 957, *Alexander in Kew Herb.*; Paarl Mt., *Drège* 1917a, *Zeyher, Pillans* 7057; Du Toit's Kloof, *Drège* 1917b, *Tyson* 833; between Wellington and Bain's Kloof, *Grant* 2216, *Pillans in Bolus Herb.* 18819, *Markotter in Stell. Univ. Herb.* 18208; Klein Drakenstein mountains near Salem, *Barker in Bolus Herb.* 19468; Seven Sisters Mt., *Stokoe* 6507.—CALEDON DIV.: mountains near Zoet Melks Vlei, *Gris-bour in Bolus Herb.* 18673, *in Guthrie Herb.* 3741.

There is considerable variation in the habit of growth and in the texture of the upper surface of the leaves. The typical form is that which occurs on the Cape Peninsula. That which is commonest on the mainland is more rigid and has larger, more open-backed leaves almost without tubercles.

89. ***P. vulgaris***, sp. nov. Frutex ramosissimus circiter 30 cm. altus; ramulis cano-pubescentibus dense foliatis; foliis acicularibus mucronulatis basi rotundatis supra laevibus vel sparse tuberculatis, marginibus arte revolutis; capitulis hemisphaericis; bracteis oblongis vel lineari-oblongis extus villosis; floribus stipitatis; tubo urceolato glabro; disco annulari; sepalis lineari-lanceolatis intus convexis extus cano-hirsutis; petalis tubo medio insertis, lamina galeata, ungue subaequilongo lineari; ovario anguste turbinate glabro; stigmatibus sessilibus pulvinato.

A much branched shrub, about 30 cm. high, with ascending, wiry branches. Branchlets slender, clothed with short, erect-spreading, silky, grey pubescence. Leaves closely set, 0.6—1 cm. long: lamina erect-spreading or ascending, acicular, mucronulate, rounded at base, with closely revolute margins covering the lower surface; upper surface more or less tubercled on the sides, occasionally with tubercles also up

the middle and scattered, each tubercle tipped with a caducous hair : petiole 0·75—1 mm. long. Capitula 0·5—1 cm. wide, hemisphaeric, subtended by several leaves, involucred with the outer bracts. Bracts of the inner flowers about 3 mm. long, oblong or linear-oblong, acute, silky-villous on the outer surface. Bracteoles 3, about 2 mm. long, linear or acicular. Flowers 2·75—3 mm. long, on a short, villous stipe : calyx-tube 1—1·25 mm. deep, urceolate, glabrous, with an annular disc at the base within : sepals 0·75 mm. long, linear-lanceolate, acute, angular-convex on the inner surface, covered with long, spreading, rather coarse, white hairs on the outer surface. Petals 0·5 mm. long, inserted about half way up the tube : lamina galeate, conical, obtuse at the apex : claw linear, about as long. Anthers reniform, 1-celled. Ovary narrowly turbinate, glabrous. Stigma sessile, pulvinate.

**South Africa : Cape Province**—LAINGSBURG DIV. : Witteberg, north slope, 4,000 ft., *Compton* 2793, 3323 (type, in Bolus Herb.) ; top of the Witteberg, 4,500-5,000 ft., *Compton* 2695, 2768, 3045, 3556, 8013.

**Var.  $\beta$ , major** ; leaves with a narrowly linear to lanceolate lamina ; capitula usually slightly larger ; flowers 3—4·5 mm. long ; sepals 1·75—2 mm. long ; petals frequently crenulate at the anterior margin of the lamina.

CALEDON DIV. : mountains at Genadendal, *Stokoe in Bolus Herb.* 22206 (type) ; Wildepaardeberg, *Stokoe* 2748.—WORCESTER DIV. : Brandvlei Kop. *Esterhuysen* 1919, *Bond.* 366.

**Var.  $\gamma$ , Burchellii** ; leaves indistinctly tubercled on the margins ; capitula 4—5 mm. wide with involucred bracts up to 2 mm. wide and having widely rounded, glabrous upper margins ; petals crenulate at the anterior margin of the lamina.

TULBAGH DIV. : Witsenberg, *Burchell* 8728 (in Kew Herb.).

This species, more particularly the variety *major*, has a close affinity with *P. callosa*, L.f. from which it chiefly differs in its leaves. Further collectings may show the necessity of uniting the two species.

90. ***P. propinqua***, *Sond. in Harv. et Sond. Fl. Cap.* i, 496 (1860)! : ***Trichocephalus elongatus***, *Ecklon et Zeyher, Enum.* 130 (1835) absque descr. !

A moderately branched shrub, about 40 cm. high, with wiry, often virgate branches. Branchlets rather slender, clothed with ascending, grey hairs. Leaves 5—15 mm. long : lamina erect-spreading, lanceolate, acute, cordate at base, with revolute margins covering a half or more of the lower surface ; upper surface smooth or more or less obscurely tubercled on the margins, up the midrib and about the apex, at first pilose upon the tubercled parts, becoming glabrous : petiole 1·5—2 mm. long. Capitula solitary, 1·5—2 cm. wide, hemisphaeric, involucred

by the outer foliaceous bracts which are about 7 mm. long. Inner bracts 6—8 mm. long, oblong, acute, very densely villous with white hairs on the outer surface, glabrous on the inner. Bracteoles 2, 7 mm. long, linear, densely villous. Flowers sessile, 8—10 mm. long: calyx-tube 2·75 mm. deep, obconic, glabrous: sepals 4—5·5 mm. long, lanceolate, acuminate, conspicuously angular-convex on the inner surface, densely covered on the outer with long, ascending, white hairs. Petal inserted at the mouth of the tube, 1—1·25 mm. long: lamina galeate, elliptic, slightly compressed laterally, with a rounded dorsal projection: claw slightly longer, ligulate. Anthers 1-celled. Ovary obconic, glabrous. Style stout, together with the depressed stigma 0·5—0·75 mm. high. Fruit 6—7 mm. long, obovate-rotundate, subtrigonus, wrinkled, chestnut-brown, with a small remnant of the base of the calyx upon the summit.

**South Africa:** without precise locality, *Lichtenstein in Berlin Herb.*, *Bowie* 40.

**Cape Province**—SWELLENDAM DIV.: mountain slopes near Swellendam, *Ecklon and Zeyher* 999, *MacOwan* 2819, *in Herb. Norm. Austr.-Afr.* 715, *Bolus* 7307: Tradouw Pass, *Compton in Kew Herb.*—RIVERSDALE DIV.: *Garcia's Pass*, *Burchell* 6872; hills near Riversdale, *Bolus* 11244; *Plattekloof*, *Muir* 564.

91. **P. Simii**, sp. nov. Fruticulus paulum ramosus; ramulis tomentosus villosisque dense foliatis; foliis anguste linearibus acutis basi rotundatis supra rugulosis pilosis, marginibus arte revolutis: capitulis hemisphaericis; bracteis foliaceis flores excedentibus; bracteolis deficientebus; floribus stipitatis; tubo cyathiformi extus supra medium breve tomentosus; sepalis oblongo-lanceolatis attenuatis intus carinatis extus tomentosus; petalis tubo calycis supra medium insertis linearibus acutis in parte superiore concavis incurvisque; ovario turbinato glabro; stylo brevissimi; stigmatibus pulvinato.

A dwarf, partly procumbent, moderately branched shrub, with wiry branches up to 30 cm. long. Branchlets slender, tomentose and villous. Leaves closely set 0·8—1·2 cm. long: lamina erect-spreading or spreading, narrowly linear, acute, rounded at base, slightly incurved, with revolute margins covering most or almost all of the lower surface: upper surface wrinkled, pilose: petiole 1—1·5 mm. long. Capitula solitary or clustered, about 1 cm. wide, hemisphaeric. Bracts 5—7 mm. long, foliaceous, exceeding the flowers. Bracteoles absent. Flowers 4·5—5 mm. long, on a villous stipe: calyx-tube cyathiform, 1 mm. deep, shortly tomentose on the upper half of the outer surface, glabrous on the lower: sepals 3 mm. long, oblong-lanceolate, attenuate, tomentose on the outer surface; inner surface keeled throughout its length, glabrous.

Petals inserted on the upper half of the tube, 0·5 mm. long, linear, acute, tapered at base, furrowed and incurved in the upper half. Anthers cordate, 1-celled. Ovary turbinate, glabrous. Style very short, stout. Stigma pulvinate. Fruit about 4 mm. long, rotundate, wrinkled, dark purple-brown, with a small calyx-area upon the summit.

**South Africa: Cape Province**—STUTTERHEIM DIV.: flat rocks on Dohne Hill, 4,000 ft., *Sim* 140 (in Bolus Herb.).

92. **P. Tysoni**, sp. nov. Frutex ramosissimus circiter 40 cm. altus; ramulis breve pubescentibus dense foliatis; foliis linearibus subacutis vel obtusis basi rotundatis supra minute tuberculato-scabridis, marginibus arte revolutis; capitulis singulis hemisphaericis; bracteis lanceolatis supra medium foliaceis; floribus stipitatis; tubo cyathiformi extus supra medium tomentoso; sepalis ovato-lanceolatis intus convexis extus tomentosis; petalis tubo medio insertis, lamina elliptico-rotundata incurvo-cucullata, ungue aequilongo lineari-cuneato; ovario obconico glabro; stylo brevi; stigmatе trilobato.

A much branched shrub about 40 cm. high, with ascending, wiry branches. Branchlets slender, clothed with short, grey pubescence. Leaves closely set, 0·6—1 cm. long: lamina erect-spreading, linear, subacute or obtuse, rounded at base, with closely revolute margins covering the lower surface; upper surface minutely tuberculate-scabrid, pubescent, becoming glabrous: petiole 1·5—2 mm. long. Capitula solitary, 6—8 mm. wide, hemisphaeric, subtended by several leaves with enlarged petioles. Bracts about 5 mm. long, lanceolate, densely villous on the lower half of the outer surface, leaf-like above. Bracteoles 2, 1—2·5 mm. long, linear, densely tomentose. Flowers 2·75—3·5 mm. long, on a hirsute stipe: calyx-tube about 1 mm. deep, cyathiform, glabrous on the lower half of the outer surface, tomentose on the upper: sepals 1·5 mm. long, ovate-lanceolate, tomentose on the outer surface, glabrous on the inner, rounded-convex in the lower half, acutely convex in the upper. Petals inserted half way up the tube, 0·5 mm. long: lamina elliptic-rotundate, incurved-cucullate: claw as long, linear-cuneate. Anthers reniform, 1-celled. Ovary obconic, glabrous. Stigma shortly 3-lobed, on a short, columnar style. Fruit 4—5 mm. long, elliptic-rotundate, subtrigonal, smooth, with a small calyx-area.

**South Africa: Cape Province**—GRIQUALAND EAST: Faku's Territory, *Dr. Sutherland in Kew Herb.*; plateau on the summit of Ingeli Mt., 6,700 feet, *Tyson* 1442 (type, in Bolus Herb.).

**Var.  $\beta$ , brevifolia**; leaves very closely set, 4—5 mm. long; petals oblanceolate or subspathulate, incurved, channelled up the inner face.

**Cape Province**—MACLEAR DIV.: Kwenkwe Mt., *Bolus* 8829 (type, in Bolus Herb.); Wildebeest Mt., *Flanagan* 2830.

93. ***P. glabrata***, *Thunb.*, *Diss. Phyllica* 3 (1804)!; *Fl. Cap.* 77 (1818); *Roem. et Schultes, Syst. Veg.* v, 477 (1819); *Thunb.*, *Fl. Cap.* ed. 2, p. 199 (1823); *DC.*, *Prodr.* ii, 34 (1825); *Don, Gen. Syst.* ii, 40 (1832).

A moderately branched, erect shrub. Branchlets slender, virgate, ascending, villous, becoming glabrous. Leaves 7—12 mm. long, erect-spreading: lamina lanceolate, acute, often apiculate, rounded at base, with revolute margins covering most of the lower surface or entirely covering it; upper surface obscurely scabrid or smooth except for a few minute pustules on the midrib and margins, at first villous on the lower parts of the midrib. Capitula solitary, 6—9 mm. wide, hemisphaeric, many-flowered, subtended by several leaves or leafy bracts. Bracts about 2 mm. long, linear-lanceolate, acute, with a dense covering on both sides of long, straight, silky, white hairs. Bracteoles 2, almost as long, linear, similarly villous. Flowers 3 mm. long, subsessile: calyx-tube 0.5 mm. deep, cyathiform, glabrous: sepals 1 mm. long, ovate, acuminate, very convex on the upper half, clothed outside with long, rather coarse, white hairs. Petals inserted on the upper half of the tube, 0.5—0.75 mm. long: lamina lanceolate, obtuse, concave on the inner face, sharply incurved; claw shorter, linear. Anthers 1-celled. Ovary turbinate, glabrous. Stigma subsessile.

**South Africa:** without precise locality, Masson.

The type is represented by a solitary specimen in Thunberg's herbarium. At the base of another sheet in Thunberg's herbarium is written "C. B. S. Bratt. *glabrata*  $\beta$ ." The single specimen on this sheet shows a slightly different habit which appears to be the result of receiving a check to the terminal growth. The petals are linear. When Bratt's specimen can be matched with better material it will probably prove to be a form of this species.

94. ***P. atrata***, *Licht. ex Roem. et Schultes Syst. Veg.* v, 490 (1819); *DC.*, *Prodr.* ii, 37 (1825); *Don, Gen. Syst.* ii, 42 (1832); *Sond. in Harv. et Sond. Fl. Cap.* i, 494 (1860) excl. syn. et var.: ***Trichocephalus ruber***, *Ecklon et Zeyher, Enum.* 131 (1835)! excl. syn.: ***Tylanthus atratus***, *Presl, Bot. Bemerk.* 37 (1844) absque descr.

A moderately branched shrub, usually 30—60 cm. high. Branchlets slender, clothed with short, grey pubescence with which are intermingled longer hairs. Leaves rather crowded, 6—10 mm. long: lamina erect-spreading, slightly incurved, lanceolate, acute, apiculate, cordate at base, with revolute margins almost entirely covering the lower surface; upper surface smooth, glabrous, obscurely tubercled and at first pilose on the margins which soon become glabrous: petiole about 1 mm. long. Capitula solitary, about 1 cm. wide, hemisphaeric, surrounded at base by leaves and foliaceous bracts. Bracts of the outer flowers 4—6

mm. long, consisting of considerably widened and flattened petioles with foliaceous apex. Bracts of the inner flowers about 3 mm. long, acicular, covered on the outer surface with long, ascending, grey hairs. Bracteoles 2, similar but shorter. Flowers shortly stipitate, 3—3.5 mm. long: calyx-tube 0.75—1.25 mm. deep, cyathiform, glabrous: sepals 1—1.25 mm. long, linear-lanceolate, acute, covered on the outer surface with long, white hairs, glabrous on the inner surface, distinctly convex from the apex to shortly below the middle. Petals inserted half way up the tube or on the lower half, 0.5—0.75 mm. long: lamina calyptriform, with the subacute apex slightly recurved and reaching to the mouth of the calyx-tube: claw scarcely half as long, linear. Anthers 1-celled. Ovary narrowly turbinate, glabrous. Stigma subsessile, depressed-orbicular. Fruit obovate-rotundate, 3—4 mm. long, blackish, with 3 longitudinal furrows and a small depressed area.

**South Africa: Cape Province**—CAPE DIV.: near Simon's Town, *unknown collector in Bolus Herb.* 18687.—STELLENSBOSCH DIV.: Sir Lowry's Pass, *Burchell* 8254, *Drège* 6753, *Bolus* 4120, 7321, *in Herb. Norm. Austr.-Afr.* 1121, *Schlechter* 7210, *Burt Davy* 12538, *Gillett* 686; mountain slopes near Gordon's Bay *Bolus in Bolus Herb.* 18680; mouth of Steenbras River, *Pillans* 6828, *Compton* 8029, *Salter* 4258.—CALEDON DIV.: hills near Palmiet River, *Ecklon and Zeyher* 1005, Steenbras, *Rogers* 11052, *Salter* 4210, 5223.—TULBAGH DIV.: mountains near Tulbagh Waterfall, *Zeyher in S. Afr. Mus. Herb.* 15069.

95. ***P. gracilis***, *D. Dietr., Syn. Pl.* i, 875 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 496 (1860): ***Trichocephalus gracilis***, *Ecklon et Zeyher, Enum.* 131 (1835)!: ***Tylanthus gracilis***, *Presl, Bot. Bemerk.* 37 (1844) *absque descr.*

A rather slender, much branched shrub, about 40 cm. high, occasionally up to 60 cm. Branchlets slender to very slender, thinly clothed with spreading, grey pubescence. Leaves mostly 6—10 mm. long: lamina linear-lanceolate, acute, cordate at base, with revolute margins covering most of the lower surface, erect-spreading, somewhat incurved; upper surface smooth and glabrous except for a few obscure tubercles on the margins and midrib which at first are pilose but often retain their hairs for a considerable time: petiole 0.75—1 mm. long. Capitula usually solitary, 6—10 mm. wide, hemisphaeric, surrounded by several leaves with enlarged petioles. Bracts of the inner flowers 2.5—3 mm. long, setaceous, clothed with long, white, silky hairs on the outer surface. Bracteoles 2, similar. Flowers 3—4.5 mm. long: calyx-tube 1—1.5 mm. deep, narrowly obconic, glabrous: sepals 1—1.5 mm. long, linear-lanceolate; inner surface rounded-convex, glabrous; outer surface covered with ascending, long, white hairs. Petals inserted half way up



the tube, scarcely 0.75 mm. long : lamina calyptriform, obtuse at apex, slightly recurved, with a small, rounded lobe at the anterior and side margins : claw about as long, linear. Anthers 1-celled. Ovary narrowly tubular-obconic, glabrous. Stigma subsessile, capitate. Fruit about 3.5 mm. long, obconic-rotundate, dark purple-brown, with a small depressed area on the summit.

**South Africa: Cape Province**—MALMESBURY DIV. : summit of the Paardeberg, *Pillans* 6315.—STELLENBOSCH DIV. : Jonker's Hoek, *Garside in Stellenbosch Univ. Herb.* 960, *Pillans in Bolus Herb.* 18721. —CALEDON DIV. : mountains near the Palmiet River, *Ecklon and Zeyher* 1006 ; Houw Hoek, *Bolus and MacOwan in Herb. Norm. Austr.-Afr.* 186, *Schlechter* 5452, 7568, *Guthrie* 2237 ; near Palmiet River mouth, *Stokoe in Bolus Herb.* 17605, *Levy's* 2692 ; Happy Valley, near Greyton, *Barker* 960 ; Baviaans Fontein, near Gaansbaai, *Stokoe* 7580.—BREDASDORF DIV. : Elim, *Schlechter* 7639, *Bolus in Bolus Herb.* 19043.

96. *P. nodosa*, sp. nov. Frutex ramosissimus circiter 120 cm. altus ; ramulis pubescentibus ; foliis lanceolatis acutissimis basi cordatis, marginibus arte revolutis pustulatis ; capitulis hemisphaericis ; floribus stipitatis ; tubo cyathiformi glabro ; sepalis lanceolatis convexis extus villosis ; petalis tubo medio insertis, lamina calyptriformi, ungue subaequilongio lineari ; ovario anguste obconico glabro ; stigmatibus sessilibus.

A much branched shrub about 120 cm. high, rigid in the lower parts, with ascending, wiry branches clothed with spreading, grey pubescence, and swollen at the positions of previous capitula. Leaves closely set, mostly 1—1.4 cm. long : lamina erect-spreading, lanceolate, very acute, cordate at base, with revolute margins covering about half of the lower surface ; upper surface convex, somewhat pustulate and, at first, villous on the margins : petioles 2 mm. long, unusually compressed, mostly nude or almost so at maturity. Capitula solitary, 8—10 mm. wide, hemisphaeric, subtended by many almost open-backed leaves. Bracts 4—5 mm. long, oblanceolate, dorsally grey-villous. Bracteoles 2, 3—4 mm. long, linear, dorsally villous. Flowers 4—4.5 mm. long, on a villous stipe : calyx-tube about 1.5 mm. deep, cyathiform, glabrous except for pubescence around the upper half outside : sepals 1.5 mm. long, slightly recurved, lanceolate, convex on the upper surface, densely clothed with long, white, almost straight hairs on the outer surface. Petals inserted at the middle of the tube, 0.75 mm. long : lamina calyptriform : claw about as long, narrowly linear. Anthers reniform, 1-celled. Ovary narrowly obconic, glabrous. Stigma sessile, pulvinate.

**South Africa: Cape Province**—PAARL DIV. : April Peak, 4,000 ft. alt., *Esterhuysen* 4027 (type, in *Bolus Herb.*), *Compton* 10163.

The affinity of this species is with *P. gracilis*, D. Dietr. but is dis-

tinguished by swellings on the stems and by larger leaves of a paler green colour.

97. **P. Burchellii**, sp. nov. Frutex paulum ramosus circiter 30 cm. altus; ramulis pubescentibus; foliis linearibus acutis basi rotundatis supra minute tuberculato-scabridis, marginibus arte revolutis; capitulis late conicis; bracteis infra medium obovato-rotundatis supra medium lanceolatis extus villosis; floribus stipitatis; tubo cyathiformi extus glabro vel sparse pubescente; sepalis ovato-lanceolatis convexis extus villosis; petalis tubo medio insertis, lamina late ovata incurvo-cucullata; ovario obconico glabro; stylo brevi; stigmatibus trilobato.

A moderately branched, rather slender shrub, about 30 cm. high. Branchlets ascending, slender, clothed with short, adpressed, grey pubescence. Leaves well spaced, 1—1.8 cm. long: lamina erect-spreading, linear, semiterete, acute, often apiculate, rounded at base, with closely revolute margins covering the lower surface; upper surface minutely tuberculate-scabrid, at first covered with short, adpressed, grey pubescence, becoming almost glabrous. Capitula solitary, widely conical, about 1 cm. long, many-flowered, subtended by 1 or 2 leaves. Bracts of the outer flowers about 7 mm. long, foliaceous. Bracts of the inner flowers 5—6 mm. long, obovate-rotundate in the lower half, narrowed upwards into a lanceolate, acute upper half, villous on the outer surface and on the inner surface of the lanceolate portion. Bracteoles 2, linear, acute, grey-villous. Flowers 5 mm. long, on a short, hirsute stipe: calyx-tube 1.75—2 mm. deep, cyathiform, sparsely villous on the upper half with ascending, grey hairs, glabrous or with a few strayed hairs on the lower, with an indistinct disc lining the lower half: sepals 2—2.25 mm. long, erect-spreading, ovate-lanceolate, acute, prominently convex on the inner surface, acutely convex on the upper half, villous with grey hairs on the outer surface. Petals inserted half way up the tube, about 1 mm. long: lamina widely ovate, incurved-cucullate: claw as long, oblong. Anthers reniform, 1-celled. Ovary obconic, glabrous or with a few strayed hairs from the stipe. Style scarcely 0.75 mm. long, columnar, trigonous. Stigma composed of 3 small rounded lobes.

**South Africa: Cape Province**—CALEDON DIV.: about 9 miles west of Genadendal, *Burchell* 7918 (in Kew Herbarium).

98. **P. litoralis**, *D. Dietr.*, *Syn. Pl.* i, 875 (1839); *Bernh. ex Krauss in Flora* xxvii, 347 (1844); *Krauss, Beitr.* 45 (1846): **Trichocephalus litoralis**, *Ecklon et Zeyher, Enum.* 131 (1835)!; **Tylanthus litoralis**, *Presl. Bot. Bemerk.* 37 (1844) absque descr.: **P. atrata**, *Licht. var. litoralis*, *Sond. in Harv. et Sond. Fl. Cap.* i, 495 (1860).

A much branched shrub, about 30 cm. high, with wiry branches. Branchlets shortly velvety-pubescent, slender. Leaves closely set,

7—15 mm. long : lamina erect-spreading or spreading, lanceolate, obtuse or subsacate, cordate at base, slightly incurved, with revolute margins covering from about a quarter to a half of the lower surface ; upper surface smooth, at first pilose on the margins and midrib, soon becoming glabrous : petiole 1—2 mm. long. Capitula solitary or rarely clustered on very short branchlets, about 1 cm. wide, hemisphaeric, many-flowered, involucre by a few reduced leaves and the outer bracts. Bracts of the inner flowers 2·5—3 mm. long, linear, densely covered on the outer surface with ascending, long, white hairs. Bracteoles 2, setaceous, densely villous. Flowers shortly stipitate, 3—4 mm. long : calyx-tube 0·25—0·5 mm. deep, campanulate-obconic, glabrous, with an obscure disc lining the base : sepals 1—1·5 mm. long, ovate-lanceolate, acute ; inner surface angular-convex on the upper half, glabrous ; outer surface densely covered with long, white hairs. Petals inserted at or shortly below the mouth of the tube, 0·5 mm. long : lamina orbicular, cucullate : claw as long, cuneate. Anthers 1-celled. Ovary obconic, glabrous. Stigma subsessile, rounded. Fruit about 5 mm. long, obovate-rotundate, almost smooth, chestnut-brown, with a small depression on the summit.

**South Africa** : without precise locality, *Mund. and Maire*.

**Cape Province**—KNYSNA DIV. : “between Gouwkamma and west end of Groene Vlei,” *Burchell* 5616 ; sand dunes at Groot River, *Fourcade* 1979 ; Deep Walls, *J. Phillips* 1202.—HUMANSDORP DIV. : dune country at Slang River, *E. P. Phillips* 3339, *Spearman* 49 ; between Slang and Kromme Rivers, *J. Sim* 7 ; sea shore at Robbe Hoek, *Fourcade* 1943 ; sea shore at Ratels Bosch, *Fourcade* 272 ; Assegai Bosch, *Rogers* 2852.—PORT ELIZABETH DIV. : Cape Recife, *Burchell* 4380, 4397, *T. V. Paterson* 1939 ; near the sea at Algoa Bay, *Ecklon* 231, *Ecklon and Zeyher* 1002, *Tyson* 2255 ; Fair View, *Pillans* 8360.—EAST LONDON DIV. : West Bank, *Rattray* 154.

99. ***P. comosa***, *Steud.*, *Nomen*. ed. 2, vol. ii, p. 325 (1841)! ; *Sond. in Harv. et Sond. Fl. Cap.* i, 497 (1860) : ***Trichocephalus comosus***, *Ecklon and Zeyher, Enum.* 132 (1835)! absque descr. : ***Tylanthus comosus***, *Presl, Bot. Bemerk.* 37 (1844) absque descr.

A much branched shrub about 40 cm. high. Branchlets slender, clothed with short, silky, grey pubescence. Leaves crowded, about 8 mm. long : lamina linear lanceolate, acute, subcordate at base, somewhat incurved, with closely revolute margins covering the lower surface ; upper surface rounded, rather coarsely tubercled all over, at first villous, soon becoming glabrous : petiole about 1 mm. long. Capitula about 8 mm. wide, subglobose, surrounded by a few leaves and large bracts of the outer flowers. Bracts of the inner flowers 2·5 mm. long, acicular, densely covered with long, ascending, white hairs. Bracteoles 2, similar

to the inner bracts. Flowers about 3 mm. long, shortly stipitate : calyx-tube about 1 mm. deep, cyathiform, tomentose on the outer surface : sepals 1.5 mm. long, lanceolate, tomentose on the outer surface, with a prominent median keel on the inner surface. Petals inserted half way up the tube, 0.5 mm. long : lamina galeate : claw as long, linear-oblong. Anthers 1-celled. Ovary turbinate, silky pubescent. Fruit about 5 mm. long, broadly obovate, slightly trigonous, silky pubescent, with a small depressed area on the summit.

**South Africa: Cape Province**—TULBAGH DIV. : among rocks on slopes near Tulbagh Waterfall, *Ecklon and Zeyher* 1009.

100. *P. brevifolia*, *Ecklon et Zeyher, Enum.* 133 (1835)! ; *D. Dietr., Syn. Pl.* i, 874 (1839) ; *Sond. in Harv. et Sond. Fl. Cap.* i, 493 (1860) : *Tylanthus brevifolius*, *Presl, Bot. Bemerk.* 38 (1844) absque descr. : *Phylla glabrifolia*, *O. Kuntze, Rev. Gen.* iii, § 2, p. 39 (1893)!

Plants usually 3—4 dm. high, erect, much-branched: branchlets slender, grey-pubescent. Leaves crowded, 1.75—2.5 mm. long : lamina spreading or erect-spreading, ovate-lanceolate, acute, cordate at base, strongly incurved from the middle or above, with revolute margins covering the lower surface and united below the apex ; upper surface smooth, cell-marked, at first with a tuft of short hairs at the apex, soon becoming glabrous : petiole about 0.5 mm. long, pubescent. Capitula solitary or in small clusters, 6—10 mm. wide, hemisphaeric, surrounded at base by modified leaves, furnished on the receptacle with long woolly hairs which envelope the lower half of the flowers. Bracts 2—2.5 mm. long, finely setaceous, glabrous except for one to several grey hairs at the apex. Bracteoles absent. Flowers 3.5 mm. long, stipitate : tube scarcely 1 mm. deep, cyathiform, contracted at the mouth, glabrous except for woolly hairs around the outside of the mouth, with an inconspicuous disc : sepals about 1.5 mm. long, erect-spreading, recurved from about the middle, lanceolate, attenuate ; outer surface covered with a mass of caducous, white, woolly hairs ; inner surface flat and sparsely pubescent at base, convex upwards, pale at the apex. Petals inserted near the mouth of the tube, scarcely or fully 0.5 mm. long : lamina ovate-rotundate, slightly concave on the inner side, lacerate-ciliate : claw very short. Anthers reniform, 1-celled. Ovary narrowly obconic, glabrous. Style together with the stigma about 0.5 mm. high, conical. Fruit about 3 mm. long, obovate, glabrous, dark brown, with a large disc-area.

**South Africa: Cape Province** : without precise locality, *Bolus* 8487 : CALEDON DIV. : Zwartberg, *Ecklon and Zeyher* 1017, *Bolus in Bolus Herb.* 18675, *Guthrie* 2477, *Schlechter* 5553, *Pillans in Bolus Herb.* 17150 ; Caledon, *Kuntze in Kew Herb.* without number.

101. *P. laevis*, *Steud., Nom. ed. 2, pars. ii, p. 326 (1841) absque descr.* : [*P. laevis*, *Breit., Hort. Breiterianus 351 (1817) absque descr.*; *Steud., Nom. ed. i, p. 614 (1821) absque descr.*] : *P. cordata*, var. *laevis*, *Schldl. in Linnaea vi, 195 (1831)!* : *Trichocephalus laevis*, *Ecklon et Zeyher, Enum. 130 (1835)!*

A much branched shrub, about 30 cm. high, with wiry branches. Branchlets slender, clothed with grey pubescence with which are mingled spreading, silky hairs. Leaves 5—7.5 mm. long: lamina spreading or somewhat deflexed, lanceolate or ovate-lanceolate, obtuse or tipped with an acute callus, cordate at base, incurved towards the apex, with revolute margins covering the lower surface; upper surface smooth or scabridous, glabrous or at first pilose on the midrib and apex: petiole short, dorsally compressed. Capitula 8—10 mm. wide, widely rounded above, surrounded at base by many leaves. Bracts about 4 mm. long, linear or setaceous, densely villous on the outer surface. Bracteoles 2, setaceous. Flowers stipitate, about 4 mm. long: calyx-tube 0.75—1.25 mm. deep, cyathiform, glabrous on the outer surface, sparsely pubescent on the inner except at the base: sepals 1.25—2 mm. long, lanceolate, attenuate; inner surface convex, sparsely pubescent at the base, glabrous above; outer surface with a dense covering of long, white, woolly hairs. Petals inserted half way up the tube, about 0.25 mm. long: lamina widely ovate to rotundate, somewhat cordate at base, concave on the inner side, with the upper margin lacerate-ciliate: claw almost half as long, linear. Anthers 1-celled. Ovary narrowly turbinate, glabrous. Style 0.25 mm. high, stout. Stigma divided into 3 subulate lobes.

**South Africa: Cape Province**—CALEDON DIV.: Water Kloof on the Zwartberg, *Ecklon and Zeyher 1000*; Houw Hoek, *Bolus 5148, Schlechter 5458, 8309, 9380, Pillans 6677*.

A remarkable feature of this species is the persistence, for as long as 5 years, of the involucre-like clusters of leaves which formerly surrounded the flower-heads.

102. *P. lasiantha*, sp. nov. Fruticulus ramosus; ramulis pubescentibus dense foliatis; foliis lanceolatis obtusis vel subacutis basi cordatis supra laevibus marginibus arte revolutis; capitulis singulis hemisphaericis bracteis setaceis extus villosis; floribus stipitatis; tubo cyathiformi glabro; sepalis lineari-lanceolatis attenuatis infra medium planis puberulisque supra medium convexis extus tomentosis; petalis tubo calycis supra medium insertis, lamina ovata vel elliptica attenuata vel laciniata sparse ciliata paulum concava incurva, ungue brevissimi oblongo; ovario anguste turbinate glabro; stylo conico; stigmatum pulvinato.

A moderately branched shrub of medium height, with ascending,

slender branches. Branchlets covered with short, spreading, grey hairs. Leaves closely set, 3.5—5 mm. long: lamina erect-spreading, spreading or eventually declinate, slightly incurved, lanceolate, obtuse or subacute, cordate at base, with closely revolute margins covering most of the lower surface; upper surface smooth, glabrous except for a tuft of deciduous hairs at the apex: petiole short. Capitula solitary, about 6 mm. wide, broadly hemisphaeric, involucre with short leaves with elongated petioles and with outer bracts. Bracts of the inner flowers 2 mm. long, setaceous, with long, silky hairs on the outer surface. Bracteoles 2, similar to the bracts but shorter. Flowers stipitate, 3—3.5 mm. long: calyx-tube 0.75 mm. deep, cyathiform, glabrous except for woolly hairs around the outside of the mouth: sepals 2 mm. long, linear-lanceolate, attenuate, erect-spreading, recurved from about the middle, with a dense covering of long, white, woolly hairs on the outer surface; inner surface flattened and puberulous in the lower half, angular-convex upwards. Petals inserted on the upper half of the tube, 0.5 mm. long: lamina ovate or elliptic, attenuate or lacinate, tipped with a compressed hair, sparsely ciliate, very slightly concave, incurved: claw very short, oblong. Anthers reniform, 1-celled. Ovary narrowly turbinate, glabrous. Style conical. Stigma pulvinate.

**South Africa: Cape Province**—SWELLENDAM DIV.: mountains in the district of Swellendam, *Zeyher in South Afr. Mus. Herb.* 30873.

The much longer, less incurved leaves distinguish this plant from *P. brevifolia*, E. & Z. with which it has close affinity.

103. ***P. constricta***, sp. nov. Frutex ramosissimus circiter 35 cm. altus: ramulis villosis dense foliatis; foliis linearibus obtusis vel acutis basi rotundatis supra laevibus, marginibus tuberculatis arte revolutis; capitulis plerumque singulis hemisphaericis; bracteis linearibus vel acicularibus supra medium villosis; floribus stipitatis medio constrictis; tubo urceolato extus dense tomentoso; sepalis lanceolatis acuminatis recurvis convexis infra medium sparse pubescentibus extus villosis; petalis deficientibus; staminibus tubo medio insertis; ovario fusiformi tomentoso; stylo brevi crasso.

A much branched shrub, about 35 cm. high, with ascending, wiry branches. Branchlets rather slender, villous and covered with short, grey tomentum. Leaves very closely set, 5—9 mm. long: lamina erect-spreading or spreading, somewhat incurved, linear, obtuse or tipped with an acute callus, rounded at base, semiterete, with closely revolute margins covering the lower surface; upper surface smooth, more or less tubercled and at first pilose on the margins, eventually glabrous: petiole about 1 mm. long. Capitula mostly solitary, 1—1.2 cm. wide, hemisphaeric, involucre by many leaves and outer bracts. Bracts of the inner flowers

4—5 mm. long, linear or acicular, with a tuft of long, white hair above the middle. Bracteoles 2 or 3, acicular or setaceous, villous above the middle. Flowers stipitate, 4—5 mm. long, surrounded by a mass of rather coarse, white, woolly hair, much constricted between the tube and the ovary: calyx-tube 1 mm. deep, urceolate, covered outside with long, caducous, woolly hair: sepals 1.5—2 mm. long, lanceolate, acuminate, recurved, villous on the outer surface; inner surface rounded-convex, sparsely pubescent on the lower half, red-brown, pale at the apex. Petals absent. Stamens inserted half way up the tube. Anthers 1-celled. Ovary fusiform, clothed with a mass of caducous, woolly hair. Style short and stout. Stigma trilobed. Fruit upon a villous stipe, 3.5—4 mm. long, rotundate, with 3 longitudinal furrows, glabrous, purple-brown, surmounted by a small calyx-base.

**South Africa: Cape Province**—PAARL DIV.: Wemmers Hoek Peak, *Andreae* 563; Drakenstein Mts., *Stokoe* in *Bolus Herb.* 22339, *Esterhuysen* in *Bolus Herb.* 22334.—CALEDON DIV.: summit of Sneeuwkop, *Stokoe* in *Bolus Herb.* 21869, in *South African Mus. Herb.* 50442; near Landdrost Kop, *Stokoe* 4019; Louw's Hoek Mt., 5500 ft., *Stokoe* in *Bolus Herb.* 22335.—TULBAGH DIV.: Great Winterhoek, about 6,000 ft., *Phillips* 1719.—CERES DIV.: Roodeberg, *Compton* 8397.—WORCESTER DIV.: Matroosberg, 5,000 ft., *Marloth* 2355, *A. Bolus* in *Guthrie Herb.* 4402 (type, in *Bolus Herb.*), 4397, *Gillett* 3608; Milner Peak, Hex River Mts., *Cooke* in *Marloth Herb.* 2570.—CLANWILLIAM DIV.: Cedarberg, *Marloth* 2740.—PRINCE ALBERT DIV.: Klein Zwartberg, range west of Ridge Peak, 7,000 ft., *Andreae* 1221.

**Var.  $\beta$ , *staavioides***; leaves at the base of the inflorescence very crowded in a mass resembling an involucre: outer bracts much exerted, purplish: calyx-tube 2 mm. deep, pubescent on the upper half within: stamens inserted on the lower half of the tube.

**Cape Province**—WORCESTER DIV.: Brandvlei Mt., *Steyn* in *Stellenb. Univ. Herb.* 18209, *Esterhuysen* 1951 (type, in *Bolus Herb.*), *Compton* 8835.

This is a distinct species. There is, however, some affinity with *P. laevis*, Steud. in the shape of the calyx, but it is distinguished by narrower, longer leaves and by the absence of petals.

104. ***P. calcarata*, sp. nov.** Frutex sparse ramosus; ramulis gracilibus cano-villosis dense foliatis; foliis lineari-lanceolatis basi subcordatis supra laevibus vel minute tuberculatis, marginibus revolutis; capitulis singulis hemisphaericis; bracteis linearibus acuminatis villosis flores excedentibus; floribus stipitatis medio constricto; tubo cyathiformi glabro; sepalis anguste linearibus basi latis intus convexis extus villosis; petalis tubo infra medium insertis, lamina calyptiformi, ungue longiore; ovario anguste obconico glabro; stigmatibus subsessilibus.

A sparingly branched, rather slender shrub, about 35 cm. high. Branchlets slender, clothed with long, spreading, silky, grey hairs. Leaves closely set, 1.2—1.5 cm. long: lamina linear-lanceolate, acute, subcordate at base, erect-spreading, with revolute margins covering about half of the lower, densely tomentose surface; upper surface widely rounded in transverse section, smooth or minutely tuberculate-scabrid, clothed with long, ascending, grey hairs, tardily becoming glabrous: petiole about 1 mm. long, villous. Capitula solitary, 1.5—2 cm. wide, hemisphaeric, surrounded by many, long, villous leaves. Bracts 1.3—1.8 cm. long, overtopping the outer flowers, linear, acuminate, broad-based, villous. Bracteoles 2, 7—9 mm. long, acicular, villous. Flowers shortly stipitate, about 8 mm. long: calyx-tube about 2.5 mm. deep, cyathiform, glabrous, with a thin disc adnate to the basal half: sepals 5—6 mm. long, narrowly linear, acuminate, widened at base, villous with grey hairs on the outer surface, convex and glabrous on the inner surface. Petals inserted on the lower half of the tube, about 1 mm. long: lamina calyptriform, almost spurred at the apex, with the front edge lower than the back edge: claw much longer, linear. Anthers rotundate-reniform, 1-celled. Ovary narrowly obconic, much narrower than and sharply distinguished from the tube, glabrous. Stigma subsessile.

**South Africa: Cape Province**—CALEDON DIV.: River Zonder Einde mountains, Oudebosch, *Stokoe* 2092 (in Bolus Herb.).

105. **P. lucida**, sp. nov. Frutex paulum ramosus; ramulis villosopubescentibus superne dense foliatis; foliis lanceolatis obtusis basi rotundatis supra laevibus lucidis, marginibus paulum revolutis; capitulis singulis supra late rotundatis; bracteis linearibus extus villosis; floribus stipitatis ad medium constrictis; tubo tubulo-obconico glabro; sepalis linearibus convexis extus pilosis; petalis tubo medio insertis, lamina rotundata cucullata, ungue subaequilongo cuneato-lineari; ovario anguste turbinato glabro; stigmatibus sessilibus pulvinatis.

A sparingly branched shrub, about 40 cm. high, with ascending, wiry branches. Branchlets slender, clothed with short, spreading pubescence and villous. Leaves closely set, about 1.2 cm. long: lamina erect-spreading or spreading, mostly straight, lanceolate, obtuse, rounded at base, with revolute margins covering about half of the lower surface; upper surface slightly convex, smooth or somewhat pitted on the margins, glossy, pilose on the midrib and margins, at length glabrous: petiole short, much compressed. Capitula solitary, about 1.5 cm. wide, widely rounded above, surrounded by many villous leaves. Bracts of the outer flowers about 1.3 cm. long, of the inner flowers about 1 cm. long, linear, clothed with long, grey hairs on the outer surface. Bracteoles 2,



6—8 mm. long, acicular, villous on the outer surface. Flowers stipitate, 5.5—6 mm. long, slightly curved, slightly constricted between the tube and the ovary: calyx-tube 2 mm. deep, tubular-obconic, glabrous, lined half way up with a thin disc: sepals 2.5 mm. long, linear, acute; outer surface covered with long, ascending, coarse, white hairs; inner surface angular-convex, glabrous. Petals inserted half way up the tube, 0.75 mm. long: lamina rotundate, cucullate, tapered at base into a cuneate-linear claw of about the same length. Anthers reniform, 1-celled. Ovary narrowly turbinate, glabrous. Stigma sessile, pulvinate.

**South Africa: Cape Province**—CALEDON DIV.: downs near Stanford, *Stokoe in Bolus Herb.* 22184 (type).—BREDASDORP DIV.: hill behind homestead at "Rietfontein," *Smith* 3168.

106. **P. amoena**, sp. nov. Fruticulus circiter 30 cm. altus paulum ramosus; ramulis villosis; foliis lanceolatis subacutis basi rotundatis supra laevibus, marginibus revolutis; capitulis singulis; bracteis linearilanceolatis extus villosis; floribus sessilibus; tubo infundibuliformi glabro; sepalis lanceolato-linearibus convexis extus villosis; petalis tubo medio insertis, lamina orbiculari cucullata, ungue subaequilongo cuneato-lineari; ovario anguste obconico glabro; stigmatibus sessilibus.

A dwarf shrub, probably about 30 cm. high, sparingly branched. Branchlets wiry, clothed with rather coarse, spreading, white hairs. Leaves closely set, 8—12 mm. long: lamina erect-spreading or spreading, slightly incurved, lanceolate, subacute, rounded at base, coriaceous, dorsally compressed, with revolute margins covering about half of the lower surface; upper surface smooth and shiny, pilose on the margins and up the middle, tardily becoming glabrous: petiole about 1.5 mm. long. Capitula solitary, 1.5—2 cm. wide, the outer part composed of an involucre of leaves which shortly exceed the widely rounded central part. Involucral leaves about 7 mm. long, lanceolate, with long, straight hairs on the outer surface and on the upper half of the inner. Bracts 6—7 mm. long, linear-lanceolate, with long, straight hairs on the outer surface. Bracteoles 2, about 5 mm. long, linear, villous on the outer surface. Flowers sessile, 6 mm. long: calyx-tube 2 mm. deep, infundibuliform, glabrous: sepals 2 mm. long, lanceolate-linear, villous on the outer surface, angular-convex and glabrous on the inner. Petals inserted half way up the tube, 1 mm. long: lamina orbicular, cucullate, with a rounded ridge from the front to the back of the hood: claw about as long, cuneate-linear. Anthers 1-celled. Ovary narrowly obconic, glabrous, separated from the tube by a constriction. Stigma subsessile, 3-humped.

**South Africa: Cape Province**—BREDASDORP DIV.: dunes near Brandfontein, *Schlechter* 10584.

107. **P. laevifolia**, sp. nov. Frutex paulum ramosus circiter 40 cm. altus: ramulis dense pubescentibus; foliis lanceolatis obtusis vel callosis-acutis basi subcordatis supra laevibus. marginibus rugulosis revolutis; capitulis singulis hemisphaericis; bracteis lanceolatis extus pilosis: floribus stipitatis ad medium conspicue constrictis; tubo anguste urceolato vel subcylindrico glabro; sepalis anguste linearibus acuminatis basi dilatatis intus convexis extus cano-villosis; petalis tubo calycis infra medium insertis, lamina galeata, ungue conspicue longiore anguste lineari: ovario turbinato glabro; stigmatibus sessilibus.

A moderately branched shrub about 40 cm. high, with ascending, rather wiry branchlets densely covered with grey, spreading pubescence of various lengths. Leaves erect-spreading or spreading, 8—10 mm. long: lamina lanceolate, obtuse or callus-acute, subcordate at base, with revolute margins covering about half of the lower surface; upper surface rugulose on the revolute portion of the margins, at first pilose on the margins and midrib, becoming glabrous and very smooth: petiole stout, 1 mm. long. Capitula solitary, about 1.5 cm. wide, hemisphaeric, subtended by many very pilose leaves. Bracts 8—9 mm. long (excluding hairs), lanceolate, densely covered on the back with long, straight, grey hairs: those subtending the outer flowers lanceolate, of the inner flowers linear, long-attenuate. Bracteoles almost as long, acicular, similarly hairy. Flowers 8—9 mm. long, stipitate, distinctly constricted between the tube and ovary: tube about 3.5 mm. deep, narrowly urceolate or subcylindric, slightly constricted in the lower half, glabrous: sepals 4—4.5 mm. long, narrowly linear, acuminate, widened at base; outer surface densely covered with long, straight, grey hairs; inner surface obtusely convex, glabrous. Petals 1 mm. long, inserted on the lower half of the tube: lamina galeate: claw distinctly longer, narrowly linear. Anthers reniform, 1-celled. Ovary turbinate, glabrous: stigma sessile.

**South Africa: Cape Province**—BREDASDORP DIV.: Elin, *Schlechter* 7714 (in Bolus Herb.).

108. **P. cuspidata**, *Ecklon et Zeyher, Enum.* 134 (1835)!; *D. Dietr., Syn. Pl.* i, 876 (1839): *Sond. in Harv. et Sond. Fl. Cap.* i, 493 (1860) excl. syn. *strigosa* et *Harveyi*: ***Petalopogon cuspidatus***, *Reiss. in Endl. Nov. Stirp. Dec.* 82 (1839).

A much branched shrub, 60—130 cm. high, with wiry branchlets covered with silky pubescence. Leaves 4—8 mm. long: lamina erect-spreading, ovate-lanceolate, apiculate, deeply cordate at base, slightly recurved, with revolute margins covering the lower surface, dorsally compressed: upper surface sparsely tubercled, at first pilose with grey hairs, becoming glabrous and shiny: petiole hidden, about 0.5 mm.

ong. Inflorescence a capituliform spike usually 1—1.5 em. long and 0.8—1 cm. wide, hemisphaeric or rotundate, solitary or clustered. Bracts of the lower flowers foliaceous, about 5 mm. long; those of the upper flowers about 4 mm. long, subulate, densely villous on the lower parts. Bracteoles 2, 1.5—3 mm. long, setaceous or linear, densely villous on the dorsal surface. Flowers sessile, 4—5 mm. long, covered externally with silky, white tomentum: calyx-tube 1.75—2 mm. deep, cyathiform: sepals 1.5—2 mm. long, deltoid-ovate, acuminate; inner surface prominently convex from the apex down to near the base, with a short beard across the lower half. Petals 0.5 mm. long, inserted half way up the tube: lamina orbicular, slightly cucullate, ciliate upon the upper margin: claw about half as long, oblong. Anthers 1-celled. Ovary obconic, with hairs longer and straighter than elsewhere on the flower. Style 0.5 mm. long, trigonous. Stigma conical, papillose. Fruit 6—7 mm. long, narrowly rotundate, with 3 vertical furrows, silky-tomentose or almost glabrous, with a small depressed area upon the summit.

**South Africa:** without precise locality, *Drège* 6754, *Niven in Bot. Mus. Stockholm*.

**Cape Province**—CLANWILLIAM DIV.: sandy flats near Bergvlei, *Ecklon and Zeyher* 1031, 1173; at the Olifants River, *Dickson in Bolus Herb.* 5613; Zeekoe Vlei, *Schlechter* 8509, *Pillans* 7073, *Compton* 6797; Alexander's Hoek, *Schlechter* 5129, in *Guthrie Herb.* 3363; between Graafwater and Clanwilliam, *Levyms* 1197; Boekenberg, between Bergvlei and Langvlei, *Compton* 5059: hills south-east of Lamberts Hoek Berg, *Pillans* 9071.

**Var.  $\beta$ , minor** (*Pillans* var. nov.); plants about 140 cm. high, with slender branchlets. Leaves 3.5—4 mm. long. Flowers 3—3.25 mm. long, with very short pubescence on the calyx.

**Cape Province**—PIQUETBERG DIV.: among shrubs in the upper end of Kapiteins Kloof, *Pillans* 7668.

109. **P. Thunbergiana**, *Sond. in Harv. et Sond. Fl. Cap.* i, 493 (1860)! [**P. Thunbergiana**, *E. Meyer in Drège Zwei Pfl. Doc.* 99 (1844) nomen]; **Tylanthus Thunbergianus**, *Presl, Bot. Bemerk.* 38 (1844) absque descr.

A much branched shrub, 30—50 cm. high, often rigid in the lower parts. Branchlets slender or rather wiry, with short, grey, spreading pubescence. Leaves closely set, 2.5—6 mm. long: lamina lanceolate, tipped with an acute callus, deeply cordate at base, erect-spreading, sometimes slightly recurved at the middle, with closely revolute margins covering the lower surface or almost so: upper surface smooth, shiny, punctate on the revolute portions, at first rather sparsely clothed with short, grey pubescence: petiole short, hidden by the wide, almost lobed base of the lamina. Capitula 5—10 mm. long, 5—7 mm. wide, elliptic or

rotundate, very compact, solitary, subtended by several short leaves. Bracts of the lower flowers foliaceous or partly so. Bracts of the upper flowers 2—3·5 mm. long, oblanceolate or narrowly oblong, acute, densely covered on the outer surface with silky, white hair. Bracteoles 2, slightly shorter, linear, villous. Flowers shortly stipitate, 2·5—4 mm. long, densely covered outside with long, ascending, silky, white hairs: calyx-tube 0·75—1 mm. deep, cyathiform, glabrous within: sepals 1—1·5 mm. long, deltoid-ovate, attenuate, flattened at base, angular-convex on the narrower part, bearded with white hairs on the lower half. Petals inserted half way up the tube, 0·5 mm. long: lamina orbicular, deeply concave, with pale cilia on the margin: claw scarcely as long, linear. Anthers 1-celled. Ovary obconic. Stigma divided into 3 small rounded lobes, seated upon a short, terete style.

**South Africa:** without precise locality, *Roxburgh*.

**Cape Province**—MALMESBURY DIV.: Theefontein, *Niven* 33, *Bachmann* 1766; Klipheuvel, *Moss* 8726; south slopes of the Paardeberg, *Pillans* 6318.—PAARL DIV.: between Paarl and the pont, *Drège* 1910; east slopes of the Joostenburg, *Pillans* 6261, *Levy* 3096.—STELLENBOSCH DIV.: base of the Simon's Berg, *Drège in Berlin Herb.*; Kraaifontein, *Barker in Bolus Herb.* 19467.

110. **P. Harveyi**, comb. nov.: **Trichocephalus Harveyi**, *Arnott in Hook. Journ. Bot.* iii, 253 (1841)!

A moderately branched shrub, about 30 cm. high, with wiry stems. Branchlets covered with spreading, grey pubescence. Leaves closely set, 6—13 mm. long: lamina erect-spreading, lanceolate or linear-lanceolate, obtuse or acute, cordate at base, with revolute margins covering most of the lower surface: upper surface smooth, at first pilose on the margins and midrib: petiole very short, hidden. Capitula solitary 1—1·5 cm. wide, hemisphaeric, subtended by a few leaves. Bracts about 5 mm. long, lanceolate, villous on the dorsal surface. Bracteoles 2, about 3 mm. long, setaceous, villous. Flowers 5·5—6 mm. long, upon a villous stipe, covered outside with long white silky hair which easily falls away from the tube and ovary: calyx-tube 1·75 mm. deep, cyathiform, with an inconspicuous disc lining the sides of the lower half: sepals slightly recurved, 3 mm. long, lanceolate, acuminate; upper surface flattened at the base, sharply convex above, with a beard of grey hair shortly above the base, the hairs extending upwards to well above the middle and becoming shorter. Petals inserted on the lower half of the tube, 0·5—0·75 mm. long: lamina orbicular, cucullate, densely ciliate: claw as long or slightly longer, linear. Anthers 1-celled. Ovary narrowly turbinate, with caducous hairs. Style about 0·5 mm. long, tapered into a small stigma. Fruit about 5 mm. long, obconic, obtusely

3-angled, sparsely pilose, light brown, with a small depressed area on the summit.

**South Africa**: without precise locality, *Drège* 6785, 6786, *Auge* in *Bot. Mus. Stockholm, Wallich*.

**Cape Province**—CAPE DIV.: Blauwberg, *Zeyher* 322; Doornhoogte, *Zeyher* 758; Hout Bay, *Harvey* 202; beyond Uitvlugt, *Wolley-Dod* 2092; Vygekraal, *Wolley-Dod* 984; Wynberg Flats, *MacOwan* 2745; Claremont Flats, *Schlechter* 429; Cape Flats east of Plumstead, *Salter* 248/13.—MALMESBURY DIV.: between Darling and Hopefield, *Hutchinson* 259, *Pole Evans* in *Bolus Herb.* 21961; Bok Point, *Compton* 9384 (galled).—PIQUETBERG DIV.; Piquetberg, *Bachmann* 1465.

111. **P. stipularis**, Linn., *Mant. altera* 208 (1771)!; Linn., *Syst. Veg.* ed. 13, p. 196 (1774); ed. 14, p. 235 (1788); Lam., *Illus.* ii, 77 (1793); Thunb., *Prodr. Cap.* 44 (1794); Linn., *Syst. Veg.* ed. 15, p. 246 (1797); Willd., *Sp. Pl.* i, 1110 (1798); Poir. in *Lam. Encycl. Bot.* v, 288 (1804); Thunb., *Diss. Phylica* 5 (1804); Pers., *Syn. Pl.* i, 245 (1805); Wendl., *Collect.* i, 87, tab. 32 (1805); Willd., *Enum. Hort. Berol.* 253 (1809); Ait., *Hort. Kew.* ed. 2, ii, 20 (1811); Du Mont de Cours., *Bot. Cult.* ed. 2, vi, 272 (1811); Sprengel in *Ges. Naturf. Fr. Berlin Mag.* viii, 104, tab. 8, fig. 3 (1814); Thunb., *Fl. Cap.* 81 (1818); Roem. et Schultes, *Syst. Veg.* v, 480 (1819); Link, *Enum. Hort. Berol.* i, 230 (1821); Thunb., *Fl. Cap.* ed. 2, p. 200 (1823); DC., *Prodr.* ii, 34 (1825); Linn., *Syst. Veg.* ed. 16, p. 827 (1825); D. Dietr., *Syn. Pl.* i, 874 (1839); Sond. in *Harv. et Sond. Fl. Cap.* i, 482 (1860) incl. var.; Marl. in *Deutsch. Tiefsee-Exped.* 1898-99, ii, pt. 3, p. 119 (1908): [*Sanamundae tertiae*—Breyne., *Cent.* 18, tab. 7 (1678): *Chamaelea foliis angustis*—Burme., *Rar. Afr. Pl.* 117, tab. 43, fig. 2 (1738)]: *Trichocephalus stipularis*, Brongn., *Mem. Rham.* 68, tab. 6, fig. 1 (1826); in *Ann. Sc. Nat.* x, 375, tab. 17, fig. 1 (1827); Don., *Gen. Syst.* ii, 40 (1832): **T. rhipophorus**, Ecklon et Zeyher, *Enum.* 131 (1835)!; **Phylica rhipophora**, D. Dietr., *Syn. Pl.* i, 875; **Walpersia stipularis**, Reiss. in *Endl. Gen.* 1100 (1839); **W. rhipophora**, Presl., *Bot. Bemerk.* 37 (1844); **W. Dregeana**, Presl., *op. cit.* 38.

A much branched shrub, about 60 cm. high, up to 90 cm., with ascending, wiry branches. Branchlets mostly slender, with a dense covering of short, white tomentum. Leaves mostly 0.7—1.5 cm. long, up to 2.5 cm. long: lamina linear or lanceolate-linear, rarely lanceolate or oblong-lanceolate, obtuse or tipped with an acute callus, more or less, sometimes deeply, cordate at base, semiterete, with closely revolute margins covering the lower surface or almost so, rarely open-backed; upper surface very minutely tubercled or almost smooth, at first tomentose but soon becoming glabrous: petiole about 1 mm. long. Stipules 2—

3 mm. long, linear-lanceolate or subulate, caducous. Capitula on short branchlets and clustered, or solitary, mostly 8—12 mm. wide, hemisphaeric, involucred by scarious, trilobed scales arranged in 3 or more series. Bracts 3—4 mm. long; in the lower half elliptic, cuncate-elliptic or rotundate, navicular, scarious, glabrous or villous at base; in the upper half trilobed, villous on the outer surface, the middle lobe narrowly linear or acicular, the lateral lanceolate or ovate-lanceolate, acuminate. Flowers mostly 5—8 mm. long, on a short stipe furnished with long, white hairs which cover the ovary: calyx-tube 1.25—1.5 mm. deep, campanulate, covered outside with white, woolly hair, glabrous within, with an annular disc near the base: sepals 3.5—4 mm. long, lanceolate, attenuate, or ovate at base and linear or subulate upwards; outer surface with long, woolly hair; inner surface, puberulous, angular-convex above the middle. Petals inserted shortly within the mouth of the tube, 0.25—0.5 mm. long, oblanceolate, obtuse, slightly concave on the inner side, with long cilia at the upper margins. Anthers 1-celled. Ovary obconic, sparsely villous, crowned (within the tube) with a dense growth of woolly hairs. Style about 0.75 mm. long, stout, sometimes sparsely villous. Stigma divided into 3 obtuse lobes. Fruit 6—8 mm. long, three quarters superior, rotundate or orbicular, glabrous at the base, densely tomentose above, with a portion of the calyx-base forming a small ledge around the lower half and dividing the glabrous from the tomentose portion.

**South Africa:** without precise locality, *Thunberg*, *Sparman*, *Drège* 6752, *Zeyher* 2213, *Ecklon and Zeyher* 1008, *Thom* 604, *Harvey*, *Sonnerat*, *Reynaud*, *Boivin*, *Sieber* 110, *Admiral Grey*, *Alexander*, *Lichtenstein in Berlin Herb.* 117, *Krebs in Berlin Herb.* 105, *Rogers* 16160.

**Cape Province**—CAPE DIV.: between Cape Town and Table Mt., *Burchell* 923; near Cape Town, *Castlenau* 494 partly, 499; Table Mt., *Ecklon* 114, 632, *Zeyher* 2213, *Schomburgk in Galpin Herb.* 4860, *Engler* 82, *Thode in Stell. Univ. Herb.* 6170; Kirstenbosch, *Zeyher*, *Esterhuysen* 144; Steenberg, *Mund*; Lion's Head, *Tyson* 2378, *Smith* 2917, *Dümmer* 1215; near Black River, *Wolley-Dod* 2727; Camp Ground Road, *Wolley-Dod* 2447; Cape Flats, *Bolus* 4009, *Wilms* 9113, *Phillips in S.A. Mus. Herb.* 2639, *MacOwan* 2560; Constantia Nek, *Wolley-Dod* 967; Raapenburg, *Guthrie* 118; Kenilworth Flats, *Schlechter* 692; Wynberg, *Wallich* 42, *Wilms* 3117a, *Gamble* 22419, 22452; on the Muizenberg, *MacOwan in Herb. Norm. Austr.-Afr.* 134, *Moss* 4174, *Walgate* 223; Silver Mine Valley, *Pillans* 4451; Simon's Bay, *Boivin in Berlin Herb.* 693, *Andersson*, *Wright* 182.—STELLENBOSCH DIV.: Cape Flats, *Burchell* 8357; between Hottentots Holland and Jonker's Vlei, *Burchell* 8299; flats at Stellenbosch, *Duthie* 976b; Jonker's Hoek,

*Duthie* 976a : mouth of Steenbras River, *Parker*, 3514.—PAARL DIV. : Kraaifontein, *Brown in S.A. Mus. Herb.* 4074, *Phillips in S.A. Mus. Herb.* 26040.—MALMESBURY DIV. : Hopefield, *Bachmann* 1932 ; road to Theefontein, *Bachmann* 1470 ; Darling, *Bachmann* 453 ; between Darling and Hopefield, *Hutchinson* 261 : south-west base of the Paardeberg, *Pillans* 5786 ; Mamre, *Baur* 1174.—PIQUETBERG DIV. : plateau on the Piquetberg, *Stokoe* 4579.—CLANWILLIAM DIV. : Wupperthal, *Drège* 6752b ; mountain slopes near Brakfontein, *Ecklon and Zeyher* 1007 ; between Berg Vlei and Lang Vlei, *Drège* 6752a ; St. Helena Bay, *Hove* ; Clanwilliam, *Mader in S.A. Mus. Herb.* 14994 ; Modderfontein, *Compton* 4328 ; Warm Baths, *Edwards in Bolus Herb.* 18697, *Stephens in Sladen Mem. Exped.* 7236.—CALEDON DIV. : Houwhoek and Bot River, *Zeyher* 2214.—BREDASDORP DIV. : Wagenhuis Kraal, *Fry in Galpin Herb.* 4954 ; hills at Elim, *Compton* 9130 ; Naachtwacht, *Smith* 2969 ; Elands Kloof, *Esterhuysen* 3077.—WORCESTER DIV. : mountains above Worcester, *Rehmann* 2533.—RIVERSDALE DIV. : without precise locality, *Rust* 65, 152, 607, *Muir* 4637 Zandhoogte, *Muir* 423, in *Galpin Herb.* 5180, *Smith* 3002.—MOSSEL BAY DIV. : Mossel Bay, *Moran in S.A. Mus. Herb.* 9063.—GEORGE DIV. : near Lang Vlei, *Burchell* 5689.—KNYSNA DIV. : Belvedere, *Keet* 1229, *Duthie* 664 ; hills east of Zwart Rivier, *Fourcade* 3907.

This is the only species having stipules. The leaves immediately below the capitulum have an elongated petiole to the base of which the stipules adhere. The parts composing the involucre consist of a broadened petiole bearing a much reduced leaf-lamina and flanked by enlarged, winged stipules. The bracts subtending the inner flowers consist of a petiole-like base with an acicular lamina and flanked by lanceolate lobes : these parts being respectively the altered leaf-petiole, leaf-lamina and the stipules. The development of the top of the ovary after the flowering period is, with the exception of *P. oleaeifolia*, Vent., greater than in any other species. There is a similar but not equally great development in *P. oleaeifolia*, Vent.

112. **P. montana**, *Sond. in Harv. et Sond. Fl. Cap.* i, 492 (1860) !

A moderately branched shrub, about 1.5 m. high, rigid in the lower parts, often with virgate branches. Branchlets wiry, clothed with very short, grey pubescence. Leaves usually 8—14 mm. long : lamina linear-lanceolate to linear, acute, subcordate at base, erect-spreading, slightly recurved at the apex, with closely revolute margins covering the lower surface ; upper surface closely and finely tubercled, at first silky pubescent ; petiole about 1 mm. long. Capitula about 8 mm. wide, rotundate or orbicular, subtended by several leaves. Bracts 3—4 mm. long, linear or oblong in the lower half and hastate in the upper, tomentose on the

dorsal surface. Bracteoles 5—12, imbricate, 3—3.5 mm. long, oblong-lanceolate to acicular. Flowers 3.5—5 mm. long, shortly pedicellate, silky pubescent upon the outer surface: calyx-tube 1.5—2 mm. deep, cyathiform, lined in the lower half with a fleshy disc: sepals 1.5—2 mm. long, ovate or deltoid, acuminate, angular-convex on the upper half, sometimes minutely puberulous on the angle. Petals inserted shortly within the mouth of the tube, 0.5—0.75 mm. long, setaceous, incurved at the apex, often absent or a few only present. Anthers 1-celled. Ovary broadly obconic. Style 0.5 mm. high, conical. Stigma with 3 very short and obtuse lobes. Fruit 6—7 mm. long, obovate-rotundate, wrinkled, sparsely puberulous, chestnut-brown, with a small depression on the summit.

**South Africa: Cape Province**—**NAMAQUALAND**: between Kookfontein and Klipfontein, *Drège* 3063; Leliefontein, *Drège* 6760; Khamiesberg, *Niven, Stokoe in Bolus Herb.* 21993; Leospoort, between Concordia and Steinkopf, *Schlechter* 11345; Beacon Hill, near Leliefontein, *Pearson in Sladen Mem. Exped.* 6331, 6353, 6635; Sneeuwkop, *Pearson in Sladen Mem. Exped.* 5796; mountains near Khamieskroon, *Compton* 6818.

113. *P. hirta*, nom. nov.: *P. cylindrica*, *Sond. in Harv. et Sond. Fl. Cap.* i, 491 (1860)! excl. syn. omn. et var.  $\beta$ , non Wendl.

A moderately branched shrub, 40—60 cm. high, with wiry, rather virgate branches. Branchlets pubescent and villous with grey hairs. Leaves closely set, about 1 cm. long: lamina erect-spreading, linear-lanceolate, acute, rounded at base, with revolute margins covering almost the whole of the lower surface: upper surface minutely and closely tubercled, at first covered with grey pubescence: petiole 1—2 mm. long. Inflorescence a compact ovate or cylindrical spike, solitary, 1—2.5 cm. long, 0.7—1 cm. wide. Bracts of the lower flowers foliaceous, of the upper 4—5 mm. long, ovate or lanceolate, very acute, silky-villous on the dorsal surface. Bracteoles 2, ovate to linear-lanceolate, about 3 mm. long. Flowers 4.5—5 mm. long, shortly stipitate, covered outside with short tomentum and long, ascending, silky hairs, occasionally only sparsely tomentose upon the ovary: calyx-tube about 1.25 mm. deep, cyathiform: sepals 2.5 mm. long, erect-spreading, ovate, acuminate; inner surface slightly concave at base, convex upwards, pubescent on the convex portion. Petals inserted at or near the mouth of the tube, 0.75 mm. long, linear or setaceous, acuminate, incurved. Anthers 1-celled. Ovary broadly obconic. Style about 0.5 mm. long, stout, trigonous. Stigma scarcely widened, entire. Fruit about 5 mm. long, rotundate, wrinkled, with a small depressed area on the summit.

**South Africa**: without precise locality, *Drège* 6788b, *Wallich in Kew Herb.*



**Cape Province**—CLANWILLIAM DIV.: without precise locality, *Mader in MacOwan Herb.* 2173; Grey's Pass, *Drège* 3065; between Lang Vlei and Olifants River, *Drège*; between Lang Vlei and Berg Vlei, *Zeyher* 320, *Niven* 15; between Heerenlogement and Olifants River, *Zeyher* 325; Elandsberg, *Wallich* 472; hills near Modderfontein, *Schlechter* 4980, 5100; Pakhuis, *Diels* 825; top of Nardouw Pass, *Pillans* 7077.

The affinity of this species is with *P. cylindrica*, Wendl. from which it may be distinguished by its densely hairy branchlets, tubercled leaves, 2 bracteoles, smaller flowers and less attenuate sepals.

114. ***P. Pearsonii***, sp. nov. Frutex rigidus paulum ramosus circiter 60 cm. altus; ramulis tomentosis villosisque dense foliatis; foliis anguste linearibus breve attenuatis basi rotundatis supra minute scabridis, marginibus arte revolutis; capitulis rotundatis vel ellipticis; bracteis linearibus extus grosse villosis; floribus sessilibus extus pubescentibus; tubo cyathiformi; sepalis lanceolatis attenuatis supra basin convexis; petalis tubo calycis supra medium insertis setaceis incurvis; ovario turbinato; stylo brevi conico.

A rigid, moderately branched shrub, about 60 cm. high. Branchlets wiry, often virgate, tomentose and villous. Leaves closely set, 1—1.5 cm. long: lamina erect-spreading, narrowly linear, shortly attenuate, rounded at base, semiterete, with closely revolute margins covering the lower surface or almost so; upper surface minutely scabrid, villous, rarely becoming glabrous: petiole 1.5—2 mm. long. Capitula about 1.2 cm. wide, rotundate or elliptic, subtended by a few short leaves. Bracts about 6 mm. long, linear, often foliaceous at the apex, covered on the outside and upper half within with rather coarse, long, grey hairs. Bracteoles about 6, up to 12, about 5 mm. long, acicular, villous on the outer surface. Flowers sessile, 5 mm. long, clothed with rather coarse, ascending, grey pubescence on the outer surface: calyx-tube 1.5 mm. deep, cyathiform: sepals (often 6) 2.5 mm. long, lanceolate, attenuate, obtusely convex from the apex almost to the base on the inner surface. Petals inserted on the upper half of the tube, scarcely 1 mm. long, setaceous, incurved from about the middle. Anthers reniform, 1-celled. Ovary turbinate. Style 0.5 mm. high, conical. Stigma very short, entire.

**South Africa: Cape Province**—NAMAQUALAND: near the summit of Rietkloof Mountain, main road between Garies and Bowesdorp, *Pearson in Sladen Mem. Exped.* 5691 (type, in Bolus Herb.), 5691a.

This is probably nearest *P. montana*, Sond. from which it differs by having villous branchlets, larger flowers and more attenuate sepals.

115. ***P. piquetbergensis***, sp. nov. Frutex ramosissimus circiter 70 cm. altus; ramulis cano-pubescentibus; foliis lineari-lanceolatis basi cor-

dati, tuberculatis, marginibus arte revolutis : capitulis hemisphaericis : floribus subsessilibus extus pubescentibus : tubo cyathiformi : sepalis ovato-lanceolatis convexis : petalis acicularibus sub sinibus calycis insertis ; antheris uniloculatis ; ovario obconico : stigmate sessili.

An erect, much branched shrub 60—80 cm. high, rather stout below the middle, wiry above. Branches slender, clothed with grey, spreading pubescence. Leaves 7—10 mm. long : lamina erect-spreading, linear-lanceolate, acute, cordate at base, with revolute margins covering all or most of the lower surface ; upper surface studded with well-spaced, small tubercles, each at first tipped with a soft hair : petiole about 1 mm. long, slightly compressed, pubescent. Capitula 5—7 mm. wide, hemisphaeric, many-flowered, solitary or clustered. Bracts about 3 mm. long, lanceolate, pubescent on the back. Bracteoles 3 or 4, linear, 2 mm. long, pubescent on the back. Flowers subsessile, 2.5 mm. long, clothed outside with soft, ascending, grey hairs : calyx-tube about 1.25 mm. deep, cyathiform, without a distinct disc : sepals 1.25—1.5 mm. long, ovate-lanceolate, convex, strongly recurved. Petals inserted at the mouth of the tube, acicular, scarcely 0.5 mm. long. Anthers 1-celled. Ovary obconic, surmounted by a fleshy cap projecting into the tube. Stigma sessile. Fruit 5 mm. long, obovate, sparsely pubescent except for the wide, convex summit.

**South Africa: Cape Province**—PIQUETBERG DIV. : top of Versfeld's Pass, *Pillans* 7160, 7167 ; Gruys Kop, *Pillans* 7242 ; hills between Mouton's Vley and Gruys Kop, *Pillans* 7251 ; summit of Zebra Kop, *Pillans* 7568 ; north edge of plateau on Kapitein's Kloof Mt., *Pillans* 8032 (type, in Bolus Herb.), 8033.

The affinity of this species is with *P. montana*, Sond. from which it differs in leaves and sepals.

116. *P. stanantha*, sp. nov. Fruticulus ramis ascensis ; ramulis pubescentibus plerumque dense foliatis ; foliis linearibus obtusis basi cordatis supra laevibus, marginibus arte revolutis ; capitulis singulis hemisphaericis ; bracteis linearibus ; floribus stipitatis extus pilis eadueis obtectis ; tubo anguste urceolato ; sepalis lanceolatis acuminatis intus convexis infra medium pubescentibus ; petalis sub sinibus calycis insertis, lamina ovata obtusa cucullata ad marginem superiorem fimbriata, ungue brevi cuneato ; ovario anguste obconico ; stylo brevi trigono.

A low shrub with ascending, wiry branches. Branchlets slender, clothed with a mixture of short woolly and straight pubescence. Leaves for the most part closely set, 5—8 mm. long : lamina erect-spreading, linear, obtuse, cordate at base, somewhat incurved, laterally compressed at the apex, with closely revolute margins covering the lower surface ; upper surface smooth, with deciduous, grey hairs on the margins and a

tuft at the apex: petiole very short. Capitula solitary, about 1 cm. wide, hemisphaeric, surrounded at base by many leaves having the petiole much enlarged and the lamina reduced. Bracts and the two bracteoles similar, about 3 mm. long, acicular, glabrous except for a tuft of white hairs at the apex. Flowers stipitate, about 3.5 mm. long, clothed outside with long, white, caducous hairs: calyx-tube 1 mm. deep, narrowly urceolate: sepals 1.5 mm. long, lanceolate, acuminate, rounded on the inner surface, with pubescence on the lower half and a tuft of long hairs behind the apex. Petals inserted at the mouth of the tube, 0.5 mm. long, abruptly incurved: lamina ovate, obtuse, cucullate, fimbriate along the upper margins: claw half as long, cuneate. Anthers reniform, 1-celled. Ovary very narrowly obconic. Style scarcely 0.5 mm. long, trigonal. Stigma entire. Fruit 4 mm. long, rotundate, glabrous, with 3 longitudinal furrows and a small calyx-area.

**South Africa: Cape Province**—CALEDON DIV.: Wilde Paarde Berg, *Stokoe* 2746 (type, in Bolus Herb.); Genadendal Mountain, *Stokoe* 6508; Bushman's Kloof Pass, *Esterhuysen* 4477.

117. *P. curvifolia*, comb. nov.: *P. reclinata*, *Bernh. ex Hochst. in Flora* xxvii, 347 (1844)!; in *Krauss Beitrage* 44 (1846): *Walpersia curvifolia*, *Presl, Bot. Bemerk.* 38 (1844) absque descr.

A moderately branched shrub, 60—100 cm. high, with ascending, wiry branches. Branchlets rather slender, arising, usually in a group of 3, from the old capitula, tomentose and pilose. Leaves closely set, 1—1.5 cm. long: lamina linear-lanceolate, obtuse, rounded at base, erect-spreading, incurved, eventually reflexed, with revolute margins covering most or all of the lower surface; upper surface rounded, smooth, obscurely tubercled and at first pilose on the midrib and margins, tardily becoming glabrous: petiole 1—2 mm. long. Capitula solitary, 1.5—1.8 cm. wide, hemisphaeric, with an involucre composed of leaves with a shortened lamina and enlarged petiole and of the foliaceous bracts of the outer flowers. (The greater part of this involucre may remain intact upon the living plant for 3 or 4 years.) Bracts of the inner flowers 6—8 mm. long, acicular, villous except on the lower half of the inner surface, plumose at the apex. Bracteoles absent. Flowers shortly stipitate, 6.5—7 mm. long: calyx-tube narrowly urceolate, tapered at base, 2 mm. deep, with a few long, caducous hairs on the outer surface: sepals 2—2.25 mm. long, ascending, almost straight, lanceolate, attenuate; inner surface rounded-convex, glabrous; outer surface bearing a dense mass of long, woolly, white hairs which are, for the most part, deciduous. Petals 0.75—1 mm. long, inserted on the lower half of the tube: lamina lanceolate, somewhat sulcate on the inner side, incurved above the middle;

claw scarcely as long, narrowly linear. Anthers 1-celled. Ovary about 2 mm. long, clavate, separated from the tube by a distinct constriction, with long, deciduous hairs. Style stout, together with the 3-humped stigma about 0.5 mm. high. Fruit rotundate, smooth, glabrous, red-brown.

**South Africa:** without precise locality, *Thom* 165.

**Cape Province**—GEORGE DIV.: mountains near George, *Alexander Prior in Kew Herb.*, *Bolus* 8640, *Rogers in Bolus Herb.* 18671; Montagu Pass, *Schlechter* 5848, *Fourcade* 1599, 5244, *Compton* 5150, 7342, *Penther in Bot. Mus. Stockholm, Walgate* 206; Outeniqua mountains, near George, *Drège* 6790, *Guthrie* 4288.—KNYSNA DIV.: Knysna, *Pappe*; near the Glebe, *Galpin* 3890.

118. *P. debilis*, *Ecklon et Zeyher, Enum.* 132 (1835)!; *Sond. in Harv. et Sond. Fl. Cap.* i, 493 (1860): *Tylanthus debilis*, *Presl, Bot. Bemerk.* 38 (1844) absque descr.

A much branched shrub, 30—60 cm. high. Branchlets slender, sparsely covered with short, grey tomentum. Leaves 2.5—5 mm. long: lamina spreading, cordate-lanceolate or cordate-ovate, apiculate, laterally compressed and usually incurved at the apex, with margins loosely folded over and almost always covering the lower surface; upper surface with minute, scattered tubercles (often indistinct and the surface apparently smooth), at first sparsely pilose but soon becoming glabrous: petiole 0.75—1 mm. long. Capitula 6—8 mm. wide, flattened above, surrounded by leaves with elongated petioles. Bracts of the inner flowers 2—2.5 mm. long, setaceous, glabrous on the lower half, villous on the upper. Bracteoles absent. Flowers 2.75—3 mm. long: calyx-tube 1 mm. deep, broadly urceolate, covered outside with silky, white hairs, with an indistinct disc on the lower half within: sepals 1 mm. long, ovate, attenuate; outer surface with a dense covering of white, woolly hairs; inner surface convex, glabrous. Petals inserted half way up the tube, 0.25—0.5 mm. long, setaceous or linear or linear-lanceolate in the upper half, slightly concave on the inner side, more or less incurved. Anthers 1-celled. Ovary fusiform, constricted at the summit, covered with ascending silky hairs. Style scarcely 0.5 mm. long, clavate, with a small rounded stigma.

**South Africa: Cape Province**—CALEDON DIV.: Zwartberg, *Galpin* 3892.—SWELLENDAM DIV.: mountains in Kannaland, *Ecklon and Zeyher* 1016.—RIVERSDALE DIV.: Garcia's Pass, *Bolus* 11246.—GEORGE DIV.: Montagu Pass, *Schlechter* 5818, *Compton* 5151; along streams, *Zeyher*.

**Var.  $\beta$ , Fourcadei** (*Pillans* var. nov.); flowers slightly smaller. Sepals ovate-lanceolate, for the most part flattened on the inner surface. Petals absent.

**Cape Province**—HUMANSDORP DIV.: mountain slopes at Witte Els Bosch, *Fourcade* 793; Karreedouw, *Compton* 4608.

119. **P. Keetii**, sp. nov. Frutex ramosissimus circiter 40 cm. altus; ramulis sparse villosis dense foliatis: foliis anguste linearibus vel acicularibus basi obtusis supra laevibus glabris, marginibus arte revolutis sparse tuberculatis; capitulis hemisphaericis; bracteis acicularibus extus villosis; bracteolis deficientibus; floribus stipitatis extus tomentosis; tubo cyathiformi; sepalis ovatis acuminatis ad medium sparse barbatis supra medium convexis; petalis tubo calycis supra medium insertis, lamina rotundata cucullata, ungue brevi lineari; ovario anguste turbinato; stigmatibus subsessili.

A much branched, wiry shrub, about 40 cm. high. Branchlets slender, minutely and sparsely pubescent and silky-villous. Leaves closely set, 4—5 mm. long; lamina at first erect-spreading, soon spreading, mostly somewhat incurved, narrowly linear or acicular, semiterete, rounded at base, with closely revolute margins covering the lower surface; upper surface smooth and glabrous, with well-spaced tubercles and at first pilose on the margins: petiole about 1 mm. long, ascending. Capitula 5—8 mm. wide, widely rounded over the upper surface, surrounded by a few leaves and outer foliaceous bracts. Bracts of the inner flowers 3—4 mm. long, acicular, villous on the outer surface, plumose at the apex. Bracteoles absent. Flowers 3 mm. long, on a glabrous stipe, covered outside with white, woolly hairs: calyx-tube 0.75 mm. deep, cyathiform: sepals 1 mm. long, ovate, acuminate, spreading from about the middle, angular-convex on the upper half of the inner surface, with a short and sparse beard at the base of the convex portion. Petals inserted on the upper half of the tube, 0.5 mm. long: lamina rotundate, cucullate: claw about half as long, linear. Anthers reniform, 1-celled. Ovary narrowly turbinate, separated from the tube by a constriction. Style together with the small, 3-lobed stigma scarcely 0.5 mm. long, encircled by an annulus. Fruit 3 mm. long, obovate, slightly ridged longitudinally, very sparsely pubescent, red-brown.

**South Africa: Cape Province**—KNYSNA DIV.: crest of the Hoogeberg, 4,660 ft., *Keet* 1061 (type, in Bolus Herb.).—UNIONDALE DIV.: Helpmekaar Peak, *Esterhuysen* 4582; Lauterwater, *Compton* 10482.

**Var.  $\beta$ , mollis**; leaves up to 9 mm. long, minutely tuberculate-scabrid and pubescent over the entire upper surface, tardily becoming glabrous; capitula slightly larger, and bracts of the outer flowers longer and more conspicuous; flowers up to 3.5 mm. long.

**Cape Province**—UNIONDALE DIV.: headwaters of the Wagenbooms River, 2,000 ft., *Fourcade* 2390 (type, in Bolus Herb.); north side of the Blaauwbosch Pass, *Fourcade* 2851; Formosa Peak, *Stokoe* 7294.

120. **P. virgata**, *D. Dietr., Syn. Pl.* i, 875 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 496 (1860); *Notizbl. Bot. Gart. Berlin*, app. xi, 18, figs. C, D (1903); *Engler et Drude, Veget. der Erde* ix, i, 2, fig. 422, C, D (1910); **Trichocephalus virgatus**, *Ecklon et Zeyher, Enum.* 132 (1835)!: **Tylandthus virgatus**, *Presl, Bot. Bemerk.* 37 (1844).

A much branched shrub, about 60 cm. high, with rather slender branches and slender, sparsely and minutely pubescent branchlets. Leaves mostly 7—12 mm. long: lamina erect-spreading or spreading, linear or linear-lanceolate, acute, subcordate at base, with revolute margins covering all or half of the lower surface; upper surface minutely tubercled, at first puberulous, pilose on the margins, at length glabrous: petiole scarcely 1 mm. long. Capitula usually on short branchlets and clustered, 6—8 mm. wide, hemisphaeric, few-flowered, involucred by scale-like leaves the greater part of which consists of a very much enlarged petiole. Bracts about 2.5 mm. long, linear, clothed on the outer surface with long, white hairs. Bracteoles 2, slightly shorter, filiform, plumose-villous. Flowers stipitate, 3—3.75 mm. long, much constricted between the tube and the ovary: calyx-tube cyathiform, 1 mm. deep, the outer surface glabrous or villous on the upper parts: sepals 1 mm. long, ovate, acuminate, angular-convex on the narrowed portion of the inner side, densely covered on the outer side with deciduous, long, white, woolly hairs reaching considerably beyond the tips. Petals inserted on the lower half of the tube, 0.75 mm. long: lamina calyptriform: claw as long, linear. Anthers 1-celled. Ovary fusiform, glabrous. Style stout, together with the broad stigma scarcely 0.5 mm. high. Fruit rotundate, smooth, blackish, shiny, with a small depressed area on the summit.

**South Africa: Cape Province**—CALEDON DIV.: moist places on Kleinriviersberg, *Ecklon and Zeyher* 1011, *Stokoe* 519; Hemel en Aarde, *Zeyher* 2217; Houw Hoek, *MacOwan in Herb. Norm. Austr.-Afr.* 186; mountains at Onrust River, *Schlechter* 9495, *Esterhuysen* 4227; mountains at Hermanus, *Galpin* 3887; Bot River, *Stokoe in Bolus Herb.* 16888; Caledon, *Stephensen in Stell. Univ. Herb.* 11175.

There is a form, *Bolus Herb.* 19123, from an unknown locality, in which the scale-like leaves surrounding the capitulum are more conspicuous and have their tips on a level with the top of the capitulum.

121. **P. Meyeri**, *Sond. in Harv. et Sond. Fl. Cap.* i, 488 (1860)!: **Walpersia squarrosa**, *Presl, Bot. Bemerk.* 38 (1844) *absque descr.*

A sparingly branched shrub, about 40 cm. high, with rather rigid, ascending stems. Branchlets wiry, clothed with grey, silky hairs. Leaves closely set, 8—12 mm. long: lamina ascending, erect-spreading or spreading, slightly incurved, linear, obtuse, rounded at base, with closely

revolute margins covering the lower surface, subterete; upper surface smooth, covered with short, soft, grey hairs, at length glabrous: petiole about 1.5 mm. long. Inflorescence capituliform, rotundate, densely many-flowered, 1.5—2 cm. wide, usually solitary. Bracts 1—1.2 cm. long, acicular, white-plumose. Bracteoles 2, about half as long, silky-plumose. Flowers 4—4.5 mm. long, stipitate: calyx-tube about 1.5 mm. deep, urceolate, with a cup-shaped disc at the base, covered outside with long, ascending, caducous, silky, white hairs: sepals 2 mm. long, erect-spreading, lanceolate, acuminate, covered outside by long, silky, white hairs; inner surface convex, glabrous. Petals inserted on the lower half of the tube, 0.5 mm. long: lamina rotundate, cucullate: claw slightly shorter, linear. Anthers 1-celled. Ovary fusiform, clothed with long, caducous, silky hairs. Stigma small, sessile.

**South Africa: Cape Province**—PRINCE ALBERT DIV.: Great Zwartberg, near Vrolyk, *Drège* 2350.—UNIONDALE DIV.: Mannetjeberg, *Esterhuysen* 4753.

122. *P. Salteri*, sp. nov. Frutex paulum ramosus circiter 40 cm. altus; ramulis pubescentibus dense foliatis; foliis lanceolatis callosio-acutis basi rotundatis supra sparse tuberculatis, marginibus revolutis; capitulis hemisphaericis; bracteis linearibus villosis; floribus conspicue stipitatis ad medio constrictis; tubo cyathiformi extus piloso; sepalis lanceolatis saepe supra medium attenuatis planisque extus sericeo-villosis; petalis tubo medio insertis, lamina rotundata-ovata valde cucullata, ungue brevi anguste lineari; ovario fusiformi piloso; stylo brevi.

A moderately branched, rather rigid shrub, about 40 cm. high, with ascending, wiry branches and velvety pubescent branchlets. Leaves closely set, about 1.2 cm. long: lamina erect-spreading, incurved, lanceolate, callus-acute, rounded at base, with revolute margins covering most of the lower surface; upper surface smooth except for the presence of scattered, well spaced, prominent tubercles, each at first bearing a long, grey hair: petioles about 1.5 mm. long, stout, at first villous. Capitula solitary or clustered on short branchlets, 6—8 mm. wide, hemisphaeric, surrounded by many leaves. Bracts of the outer flowers about 8 mm. long, lanceolate, villous, with leafy tips; bracts of the inner flowers about 6 mm. long, linear, villous. Bracteoles absent. Flowers distinctly stipitate, 4 mm. long, constricted between the tube and ovary: calyx-tube 1.25—1.5 mm. deep, cyathiform, with long, hyaline, caducous hairs on the outer surface, lined with a thin disc at the base: sepals 1.5 mm. long, lanceolate, often much tapered from about the middle upwards, flattened on the lower half of the inner surface, convex on the upper, persistently grey-villous on the outer surface except at the glabrous

base. Petals inserted half way up the tube, scarcely 0·75 mm. long: lamina rotundate-ovate, deeply cucullate: claw scarcely half as long, narrowly linear. Anthers cordate, 1-celled. Ovary fusiform, bearing long, caducous hairs. Style stout, together with the small stigma scarcely 0·5 mm. long. Fruit about 5 mm. long, widely obovate, with 3 well marked longitudinal furrows, topped by a small calyx-area.

**South Africa: Cape Province**—CLANWILLIAM DIV.: summit of Elands Kloof Pass, *Salter* 7296 (in *Bolus* Herb.).

The structure of the calyx associates this species with *P. rigida*, E. & Z. from which it is easily distinguished by much smaller leaves, inflorescences and flowers and by the presence of well developed petals.

123. ***P. insignis***, sp. nov. Frutex rigidus circiter 60 cm. altus; ramulis villosis dense foliatis; foliis incurvatis lineari-lanceolatis basi rotundatis supra tuberculatis primum pilosis deinde glabris, marginibus arte revolutis; capitulis hemisphaericis; bracteis linearibus vel acicularibus extus villosis; bracteolis deficientibus; floribus stipitatis extus villosis; tubo anguste cyathiformi; sepalis lanceolatis vel ovato-lanceolatis convexis; petalis tubo medio insertis, lamina lanceolata vel oblongo-elliptica concava apice incurva vel cucullata, ungue acquilongo lineari; ovario anguste obconico; stylo subulato; stigmatibus brevissime trilobato.

A moderately branched, rather rigid shrub, about 60 cm. high, with ascending, often virgate and verticillate branches having distinct, rotundate swellings where inflorescences have been developed. Branchlets wiry, clothed with spreading, buff-coloured hairs. Leaves closely set, 1—1·8 cm. long: lamina somewhat incurved, erect-spreading, linear-lanceolate, mucronulate, semiterete, rounded at base, with closely revolute margins entirely covering the lower surface or almost so; upper surface evenly tubercled with closely set tubercles, at first conspicuously pilose, becoming glabrous: petiole about 2 mm. long. Capitula 1—1·5 cm. wide, hemisphaeric, surrounded by many pilose leaves and foliaceous bracts. Bracts of the inner flowers 5—7 mm. long, linear or acicular, with a dense covering on the outer surface of long, wavy, grey hairs. Bracteoles absent. Flowers stipitate, 4·5—7 mm. long, covered outside with long, ascending, wavy hairs which are caducous on the tube and ovary: calyx-tube 1·75—2 mm. deep, narrow-cyathiform, with an inconspicuous disc lining the lower half: sepals 1·5—2 mm. long, lanceolate or ovate-lanceolate, acute or subobtuse, spreading from the middle; inner surface rounded-convex, angular towards the apex, with minute, papilliform hairs on the angle. Petals inserted half way up the tube, about 0·75 mm. long: lamina elliptic, lanceolate, oblanceolate- or oblong-elliptic, acute or obtuse, incurved at the apex or cucullate, concave: claw linear or cuneate-linear, as long or slightly shorter.



Anthers cordate, 1-celled. Ovary tubular-obovoid. Style 0.75—1 mm. long, cylindrical. Stigma scarcely distinct, shortly conical, divided into 3 minute, erect lobes.

**South Africa: Cape Province**—CLANWILLIAM DIV.: Ezelsbank, *Drège* 2350; Sneeuwkop, near Wupperthal, *Bodkin in Bolus Herb.* 8963 (type), *Compton* 6211; Cedarberg, *Mann in Marloth Herb.* 11387; Engelsmans Kloof, *Pocock* 184; Elands Kloof, *Compton* 5353, 6524, in *Bolus Herb.* 22183, *Esterhuysen* 3213.

Hutchinson 627, from a flower show in Ceres, belongs here.

124. **P. pubescens**, *Ait., Hort. Kew.* i, 268 (1789)!; *Pers., Syn. Pl.* i, 245 (1805) excl. syn. Lam.; *Ait., Hort. Kew.* ed. 2, vol. ii, p. 19 (1811): [*Chamaelea pilosa*,—*Burm., Rar. Afr. Pl.* 121, tab. 44, fig. 3 (1788)]: **P. capitata**, *Thunb., Prodr. Cap.* 45 (1794)!; *Willd., Sp. Pl.* i, 1109 (1798); *Thunb., Diss. Phyllica* 7 (1804); *Poir. in Lam. Encycl. Bot.* v, 290 (1804); *Willd., Enum. Hort. Berol.* 252 (1809); *Wendl., Collect.* ii, 37, tab. 50 (1810); *Thunb., Fl. Cap.* 86 (1818); *Roem. et Schultes, Syst. Veg.* v, 484 (1819); *Link. Enum. Hort. Berol.* i, 231 (1821); *Thunb., Fl. Cap.* ed. 2, p. 203 (1823); *Ed., Bot. Reg.* tab. 711 (1823); *Linn., Syst. Veg.* ed. 16, vol. i, p. 827 (1825); *DC., Prodr.* ii, 36 (1825); *Don, Gen. Syst.* ii, 41 (1832); *D. Dietr., Syn. Pl.* i, 875 (1839); *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 378 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 490 (1860) incl. var. a; *Notizbl. Bot. Gart. Berlin*, app. xi, 18, figs. A, B (1903); *Engler et Prude, Veget. der Erde* ix, i, 2, fig. 422, A, B (1910); *Marl., Fl. S. Afr.* ii, § 2, tab. 56, fig. B, p. 164, fig. 112, tab. 57 (1925); **P. plumosa**, *Lodd., Bot. Cab. tab.* 253 (1818) non Linn.

A moderately branched shrub, up to 130 cm. high, the wiry branches and rather slender branchlets hirsute with ascending, silky, grey or buff hairs. Leaves closely set on the younger parts, mostly 2.5—3.5 cm. long: lamina erect-spreading, slightly curved outwards, lanceolate or linear-lanceolate, acute, rounded at base, with revolute margins covering about half of the lower surface, almost smooth or with minute, scattered tubercles upon the upper surface, at first pilose, becoming glabrous: petiole 1—3 mm. long. Capitula usually solitary, 4—5 cm. wide including the bracts, about 2 cm. high, conical in the centre, subtended by many villous leaves. Bracts 2—3 cm. long, erect-spreading or spreading, somewhat recurved, linear-lanceolate, long-attenuate, villous, except on the base of the inner surface, with long grey or buff hairs. Bracteoles 2, 4—8 mm. long, acicular, villous on the outer surface. Flowers 5—9 mm. long, sessile, slightly curved, villous with long, ascending, grey hairs on the outer surface: calyx-tube 1—3 mm. deep, cyathiform, slightly compressed dorsally, glabrous on the lower half within, pubescent on the upper, with a shallow cup-shaped disc: sepals

4—5 mm. long, deltoid and pubescent in the lower half, thence attenuate, angular-convex and glabrescent. Petals inserted on the upper half of the tube, 0·5—0·75 mm. long, absent from some flowers: lamina ovate or lanceolate-ovate, acute, concave on the inner side, with a few small hairs on the outer surface or glabrous: claw short, oblong. Anthers 1-celled. Ovary obconic. Style about 0·75 mm. high, trigonous, columnar. Stigma divided into 3 small, erect lobes. Fruit 7—8 mm. long, obovate-rotundate, obtusely 3-angled, thinly pilose, chestnut-brown, with a small slightly depressed area on the summit.

**South Africa:** without precise locality, *Oldenland* in *Berlin Herb.*, *Thunberg*, *Niven* 3, *Sieber* 67, 90.

**Cape Province**—CAPE DIV.: vicinity of Cape Town, *Burchell* 8401, *Rogers* 2456; Table Mt., *Drège* 6779, *Engler* 187, *Moss* 17096, *Muir* 757; Blinkwater, *Rehmann* 1276; Devil's Peak, *Burchell* 8472, *Ecklon* and *Zeyher* 1025, *Wilms* 3118, *Bolus* 2996, *Wolley-Dod* 38, *Thode* in *Stell. Univ. Herb.* 6165; rocky places near Rondebosch, *Zeyher* 2211; Paradise, *Burchell* 452; Kirstenbosch, *Moss* 4510, 11597, *Grant* 2305a, *Esterhuysen* 165, *Salter* 248/10; Wynberg Hill, *Guthrie* 301, *Gamble* 22271; lower slopes of Table Mt., near Klassenbosch, *MacOwan* 2534, in *Herb. Norm. Austr.-Afr.* 132; Constantia, *Burchell* 8534, *Wallich*; Orange Kloof, *Engler* 238.—WORCESTER DIV.: Worcester, *Cooper* 1594.

**Var.  $\beta$ , angustifolia** (*Sond. in Harv. et Sond. Fl. Cap.* i, 490)!; leaf-lamina linear, attenuate, or acicular, more copiously villous on the branchlets; capitula rather larger, denser and more showy; bracts with longer hairs.

**Cape Province**—STELLENBOSCH DIV.: Stellenbosch, *Drège* 6780, *Niven* 7, *Andersson* in *Bot. Mus. Stockholm*; sides of Berg River, *Harvey*; Jonker's Hoek, *Pillans* in *Bolus Herb.* 18497, unknown collector in *Stell. Univ. Herb.* 1260a.

**Var.  $\gamma$ , orientalis** (*Pillans*, var. nov.); leaves linear or acicular, with closely revolute margins covering the lower surface, 1—2 cm. long, almost smooth on the upper surface, more or less tubercled on the margins; capitula 2·5—3 cm. wide; bracts shorter than in the typical form of the species; sepals usually pubescent over the inner surface; petals in their entirety oblanceolate, acute, mostly absent; fruit rotundate, glabrous or sparingly pilose.

**Cape Province**—BREDASDORP DIV.: Elim, *Schlechter* 7711 (type); Rietfontein, *Smith* 3157.—RIVERSDALE DIV.: between Albertinia and the sea, *Muir* 1411.

125. **P. Dodii**, *N.E. Br. in Journ. Bot.* xxxix, 399 (1901)!; **P. capitata**, *Thunb.* var. **brachycephala**, *Sond. in Harv. et Sond. Fl. Cap.* i, 490 (1860)!

A moderately branched shrub, up to 40 cm. high, with wiry, reddish

branches. Branchlets glabrous or sparsely pubescent. Leaves closely set 0·8—2 cm. long: lamina erect-spreading or spreading, straight or slightly incurved, linear, mucronulate, rounded at base, with closely revolute margins covering the lower surface; upper surface smooth, obscurely tubercled and at first villous on the margins, soon becoming glabrous: petiole 1—2·5 mm. long, much compressed dorsally, glabrous or at first pubescent on the margins. Capitula 1—1·5 cm. wide, solitary, orbicular, surrounded by many villous leaves with enlarged petioles. Bracts 1—2 cm. long, linear-lanceolate, attenuate, flattened, silky villous on the inner surface, glabrous at the base except for the coarse ciliation on the margins. Bracteoles 2, up to 6 mm. long, linear, pilose. Flowers 5—7 mm. long, shortly stipitate: calyx-tube 1·75—2 mm. deep, with short, sparse pubescence on the outer surface, cyathiform: sepals 2·5—4·5 mm. long, ovate, long-attenuate; inner surface rounded-convex except at the flattened base, glabrous or with a row of minute hairs parallel with each margin at the base; outer surface clothed with long, ascending, straight hairs. Petals inserted at the mouth of the tube, 0·5—1 mm. long, lanceolate, tapered at base and apex, slightly convex on the inner surface, incurved. Anthers 1-celled. Ovary obconic, clothed with long, ascending, straight hairs. Style about 0·75 mm. high, cylindric. Stigma with 3 rounded lobes. Fruit about 6 mm. long, orbicular, obtusely 3-angled, with a small depressed area on the summit, sparsely pubescent or glabrate.

**South Africa:** without precise locality, *Admiral Grey in Kew Herb.*

**Cape Province**—CAPE DIV.: sandy flats between Blaauwberg and Tygerberg, *Drège* 6781; lower slopes of Paul's Berg, *Wolley-Dod*, 2872; Buffels Bay, *Pillans* 6176; hills north-west of Simon's Town, *Pillans* 4317, *Salter* 248/9, in *Bolus Herb.* 18485.—CALEDON DIV.: Baviaans Fontein, *Stokoe* 7578.—BREDASDORP DIV.: Rietfontein, *Smith* 3150; near the sea south-east of Brandfontein, *Smith* 3117; near Cape Agulhas, *Esterhuysen* 4419.—KNYSNA DIV.: "road between Gowkamma Station and Station at west end of Groene Valley," *Burchell* 5615.

126. **P. reversa**, sp. nov. Fruticulus paulum ramosus; ramulis breve tomentosus dense foliatis; foliis linearibus vel lanceolato-linearibus obtusis basi rotundatis; capitulis singulis paucifloris; bracteis acicularibus villosis; floribus subsessilibus extus villosis; tubo anguste cyathiformi; sepalis lanceolatis supra medium convexis; petalis sub sinibus calycis insertis oblanceolatis acutis vel obtusis extus paulum concavis recurvis; ovario obconico; stylo subulato; stigmatibus parvo trigono.

A moderately branched, low shrub with ascending rigid branches. Branchlets wiry, covered with very short tomentum. Leaves crowded, 8—10 mm. long: lamina linear or lanceolate-linear, obtuse, rounded at

base, dorsally compressed, slightly incurved, with closely revolute margins covering the lower surface; upper surface smooth, coarsely tubercled and at first pilose on the margins, soon becoming glabrous: petiole short and stout. Capitula solitary, 1—1.5 cm. wide, few-flowered, surrounded at base by ascending leaves and leafy bracts. Bracts 1—1.2 cm. long, acicular, recurved above the middle, villous. Bracteoles 2, 6—7 mm. long, acicular, villous. Flowers subsessile, about 9 mm. long, with a dense, persistent covering outside of long, ascending, straight, white hairs: calyx-tube 4.5 mm. deep, narrowly cyathiform, with an inconspicuous fleshy disc at the base: sepals 2—2.5 mm. long, lanceolate, acute: inner surface rounded-convex on the upper half, glabrous. Petals inserted at the mouth of the tube, scarcely 0.5 mm. long, ascending, curved backwards, oblanceolate, acute or obtuse, slightly concave on the outer side. Anthers reniform, 1-celled. Ovary obconic. Style 1.5 mm. long, slender. Stigma small, trigonous.

**South Africa: Cape Province**—WORCESTER DIV.: Matroosberg, Mrs. Davidson 10 (in Bolus Herb.).

A distinct species remarkable for having petals which apparently face outwards.

127. **P. spicata**, *Linn. f., Suppl.* 153 (1781)!; *Linn., Syst. Veg.* ed. 14, p. 235 (1788); *Ait., Hort. Kew* i, 269 (1789); *Lam., Illus.* ii, 78 (1793); *Thunb., Prodr. Cap.* 45 (1794); *Linn., Syst. Veg.* ed. 15, p. 246 (1797); *Willd., Sp. Pl.* i, 1111 (1798); *Thunb., Diss. Phylica* 9 (1804); *Poir. in Lam. Encycl. Bot.* v, 293 (1804); *Pers., Syn. Pl.* i, 245 (1805); *Ait., Hort. Kew.* ed. 2, vol. ii, p. 21 (1811); *Du Mont de Cours., Bot. Cult.* ed. 2, vi, 274 (1811); *Thunb., Fl. Cap.* 89 (1818); *Roem. et Schultes, Syst. Veg.* v, 489 (1819); *Lam., Planches Bot.* tab. 127, fig. 3 (1823); *Thunb., Fl. Cap.* ed. 2, p. 204 (1823); *Linn., Syst. Veg.* ed. 16, i, 828 (1825); *DC., Prodr.* ii, 36 (1825); *D. Dietr., Syn. Pl.* i, 875 (1839) excl. syn. *Thunb.: Soud. in Harv. et Sond. Fl. Cap.* i, 491 (1860) **P. elongata**, *Salisb., Prodr.* 140 (1796): **Trichocephalus spicatus**, *Brongn., Mem. Rham.* 68 (1826); *in Ann. Sc. Nat.* x, 375 (1827); *Don, Gen. Syst.* ii, 40 (1832): **Walpersia spicata**, *Reiss. in Endl. Gen.* 1100 (1839): **W. capitata**, *Presl, Bot. Bemerk.* 37 (1844).

A much branched shrub, up to 2 m. high, stout in the lower parts, with ascending branches. Branchlets wiry or rather slender, clothed with spreading, grey pubescence. Leaves closely set, mostly 1.5—2 cm. long: lamina ascending or erect-spreading, ovate-lanceolate, ovate or lanceolate, acute or acuminate, widely cordate at base, slightly revolute at the margins; upper surface minutely tubercled, often with evident secondary nerves; lower surface mostly exposed, with a dense covering of white tomentum, often with evident secondary nerves: petiole 1.5—

2 mm. long. Spikes solitary, rotundate, conical or cylindric, 1·2—6 cm. long, dense, with a general colouring of silvery white. Bracts 5—7 mm. long, usually oblong in the lower half and widening at the middle into an ovate-lanceolate upper half, or cuneate at base widening upwards into a hastate upper portion, acute; outer surface very densely covered with long, white hairs on the lower half, with fewer and shorter hairs on the upper; inner surface glabrous or with silky hairs on the midrib and upper half. Bracteoles 2, about 4 mm. long, linear, densely villous on the outer surface. Flowers 7—8 mm. long, curved upwards; calyx-tube 1·75—2 mm. deep, obconic, densely villous upon the upper half of the outer surface, less so on the lower, glabrous within, with a vestige of an annular disc near the base: sepals 4—5 mm. long, linear-lanceolate, acuminate, with a dense covering of long white hairs on the outer surface, keeled up the middle of the inner surface, glabrous except for minute pubescence on the keel. Petals inserted on the upper half of the tube, 1 mm. long, linear, acute, tapered towards the base, incurved, glabrous or with a few woolly hairs on the dorsal surface. Anthers 1-celled. Ovary obconic, glabrous or very sparsely pubescent, upon a short, villous stipe. Style 0·5 mm. long, cylindric. Stigma with 3 minute lobes. Fruit 8—9 mm. long, rotundate, subtrilobed, wrinkled, glabrous, chestnut-brown.

**South Africa:** without precise locality, *Drège* 6763, *Niven*, *Roxburgh*, *Gueinzius*.

**Cape Province**—MALMESBURY DIV.: Paardeberg, *Thunberg*; Berg River at Hazenkraal, *Bachmann* 1472.—STELLENBOSCH DIV.: mountains near Stellenbosch, *Langveld in Stell. Univ. Herb.* 425; cliffs at the waterfall on the Simonsberg, *Drège* b; Stellenbosch, *Andersson in Bot. Mus. Stockholm*.—PAARL DIV.: Paarl Mountain, *Drège*, *Zeyher*, *Alexander*; French Hoek, *Niven* 36, *Smith* 2632, 2661; Drakenstein mountains, *Tyson* 835; near Wellington, *Tulbagh in Medley Wood Herb.* 3714; Du Toit's Kloof, *Drège* 1918.—TULBAGH DIV.: Tulbagh Waterfall, *Ecklon and Zeyher* 997, *Hutchinson* 407.—PIQUETBERG DIV.: Pietersfontein, near Piquetberg, *Drège* 6764; Piquetberg, *Bolus in Bolus Herb.* 18684.—CLANWILLIAM DIV.: Kruis River, *Zeyher* 319; between Pakhuis and Bidouw, *Drège* 6787.—CERES DIV.: near Ceres, *Bolus in Bolus Herb.* 18685; mountains above Michell's Pass, *Schlechter* 9952.—WORCESTER DIV.: Waaihoek Flats at base of Chavonnesberg, *Galpin in Bolus Herb.* 22179.

**Var.  $\gamma$ , piquetbergensis** (*Pillans* var. nov.); leaves smaller, up to 8 mm. long; inflorescence 1—1·5 cm. long, conical; calyx densely villous over the entire outer surface; sepals with the pubescence on the inner surface extending downwards to the sinuses; petals oblanceolate,

obtuse, tapered at base, concave on the inner side, incurved, with distinct cilia on the upper half.

**Cape Province**—PIQUETBERG DIV.: bottom of Bokloof, west side of Kapiteins Kloof, *Pillans* 8006 (in Bolus Herb.).

128. **P. agathosmoides**, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis pubescentibus; foliis anguste linearibus acutis basi obtusis supra minute tuberculatis, marginibus arte revolutis; floribus stipitatis in spicatis compactis dispositis; bracteis lanceolatis; tubo cyathiformi glabro; sepalis deltoideo-ovatis attenuatis basi planis puberulisque apici versus convexis extus villosis; petalis setaceis tubo calycis supra medium insertis; ovario obconico glabro; stylo brevissimo.

A much branched shrub, about 60 cm. high, with ascending, wiry branches. Branchlets slender, clothed with short, adpressed grey pubescence. Leaves crowded, ascending or erect-spreading, 7—10 mm. long: lamina narrowly linear, tipped with an acute callus, rounded at base, mostly straight, with closely revolute margins covering the lower surface; upper surface minutely tubercled, at first sparsely clothed with short, adpressed, grey hairs, becoming glabrous: petiole about 1.5 mm. long. Spikes compact, rotundate or ovate, 0.5—2 cm. long. Bracts of the lower flowers foliaceous, the upper 4—5 mm. long, lanceolate, flattened, with revolute, pubescent margins. Bracteoles 4—7, lanceolate or linear-lanceolate, convex on the inner side, ciliate. Flowers shortly stipitate, about 4 mm. long: calyx-tube scarcely 1.5 mm. deep, cyathiform, glabrous: sepals 2 mm. long, deltoid-ovate, long-attenuate, villous on the outer surface, flattened and shortly pubescent on the basal part of the inner surface, convex on the attenuate portion, minutely puberulous on the angle. Petals inserted on the upper half of the tube, about 0.75 mm. long, setaceous, incurved. Anthers 1-celled. Ovary obconic, glabrous. Style very short, columnar. Stigma minute, shortly lobed.

**South Africa: Cape Province**—CALVINIA DIV.: near Nieuwoudtville, Oorlogs Kloof, *M. Lavis* in *Bolus* Herb. 19521.

The affinity is with *P. pustulata*, Phill. The distinguishing characters are leaves with the lamina minutely tubercled over the entire upper surface, more elongated inflorescence and twice as many bracteoles.

129. **P. pustulata**, *Phill. in Ann. South African Mus.* ix, 118 (1913)!

A much branched shrub, about 90 cm. high, with wiry, reddish branches. Branchlets slender sparsely pilose, reddish. Leaves closely set, 1.2—1.8 cm. long: lamina linear or acicular, acute, rounded at base, ascending, with closely revolute margins covering the lower surface; upper surface sparingly tubercled and, at first, pilose on the margins and up the midrib; petiole 1—1.5 mm. long. Capitula solitary, widely

conical or hemisphaeric, about 1 cm. high, subtended by several leaves. Bracts 3—4 mm. long, linear-lanceolate, acute, sulcate on the inner surface, ciliate. Bracteoles 2, slightly shorter, linear, ciliate. Flowers 5 mm. long: calyx-tube 1.75 mm. deep, urceolate, glabrous on the lower half of the outer surface, villous on the upper: sepals 2—2.5 mm. long, ovate, long-attenuate, sparsely pubescent on the basal portion and a short distance up the middle of the inner surface, angular-convex and scabridous on the attenuate portion, villous with spreading white hairs on the outer surface. Petals inserted half way up the tube, 0.5—0.75 mm. long, setaceous, incurved, possibly sometimes absent. Anthers 1-celled. Ovary obconic, glabrous. Style and stigma together 0.5 mm. high, conical.

**South Africa: Cape Province**—VAN RHYNSDORP DIV.: near a stream on the Giftberg, *Phillips in Sladen Mem. Exped.* 7681; near the top of the west slope of the Giftberg, *Salter* 7270; Snorkfontein, *Compton* 7213.

130. ***P. cylindrica***, *Wendl.*, *Coll. Pl.* i, 29, tab. 7 (1805)!; in *Willd. Enum. Hort. Berol.* 253 (1809); *Sprengel in Ges. Naturf. Fr. Berl. Mag.* viii, 104, tab. 8, fig. 5 (1814) excl. syn.; *Poir. in Lam. Encycl. Suppl.* iv, 401 (1816); *Roem. et Schultes, Syst. Veg.* v, 489 (1819) excl. syn. *P. pubescens*; *Link, Enum. Hort. Berol.* 231 (1821); *DC., Prodr.* ii, 35 (1825) excl. syn. *Lam.*; *Linn., Syst. Veg.* ed. 16, i, 828 (1825) excl. syn. omn.; *Don, Gen. Syst.* ii, 42 (1832); *D. Dietr., Syn. Pl.* i, 876 (1839); *A. Dietr. in Otto et Dietr. Allg. Gartenz.* vii, 379 (1839): ***Walpersia hirtifolia***, *Presl, Bot. Bemerk.* 38 (1844) absque descr.: ***P. cylindrica***, *Sond. non Wendl.*, var. ***glabrata***, *Sond. in Harv. et Sond. Fl. Cap.* i, 491 (1860)!

A shrub about 60 cm. high, with ascending virgate branches sparsely pilose with grey hairs. Leaves 0.7—1.2 cm. long: lamina erect-spreading, linear-lanceolate, apiculate, cordate at base, with closely revolute margins covering the lower surface; upper surface tubercled (on some plants obscurely so) and villous on the revolute portions and depressed midrib, at length glabrous: petiole 1—1.5 mm. long. Inflorescence a terminal capitulum, 1.5—2.5 cm. long, cylindrical or conical, dense, many-flowered. Bracts of the lower flowers foliaceous; those of the upper 5—6 mm. long, lanceolate, acuminate, ciliate, dorsally villous. Bracteoles 5—10, linear, 4—5 mm. long, dorsally villous. Flowers shortly stipitate, 5.5—6 mm. long: calyx-tube 1.5 mm. deep, campanulate, shortly villous on the upper half of the outer surface, glabrous elsewhere: sepals about 3 mm. long, lanceolate, acuminate, covered outside with ascending, straight, white hairs; inner surface sharply convex, pubescent on the angle. Petals inserted shortly below the mouth of the tube, 0.75 mm. long, setaceous, incurved. Anthers 1-celled. Ovary turbinate, glabrous. Style 0.5 mm. long, stout, surmounted by 3 very short, erect stigmatic

lobes. Fruit about 8 mm. long, obovate-rotundate, glabrous, with a small depressed area on the summit.

**South Africa:** without precise locality, *Wallich in Bot. Mus. Stockholm.*

**Cape Province**—PIQUETBERG DIV.: Mouton's Vlei, *Pillans* 7312.—CLANWILLIAM DIV.: Bergvlei. *Drège* 6788a; Boekenberg, between Bergvlei and Langvlei, *Compton* 5058; Grey's Pass, *Pillans* 6310; Brakfontein, *Schlechter* 7979; Warm Baths, *Stephens in Sladen Mem. Exped.* 7238; Keerom, *Pillans* 8821.

Wendland's illustration of the type shows a cultivated plant with an abnormally large inflorescence having 10 bracteoles slightly longer than the flowers.

131. **P. Barnardii**, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis cano-pubescentibus dense foliatis; foliis linearibus acutis basi obtusis vel subcordatis supra tuberculatis, marginibus arte revolutis; capitulis rotundatis; bracteis ellipticis acuminatis pubescentibus; floribus sessilibus extus pubescentibus; tubo cyathiformi; sepalis ovatis attenuatis convexis; petalis persaepe deficientibus acicularibus tubo calycis supra medium insertis; antheris cordatis uniloculatis; ovario late obconico; stylo brevissimi; stigmatate pulvinate.

A much branched shrub, about 60 cm. high, rigid in the lower parts, wiry upwards. Branchlets slender, with spreading, silky, white pubescence. Leaves closely set 0.7—1.2 cm. long; lamina linear, narrowed towards the apex, acute, rounded or subcordate at base, erect-spreading; semiterete, with closely revolute margins covering the lower surface; upper surface tubercled, softly pilose, at length glabrous; petiole 1 mm. long. Capitula solitary or frequently clustered, 6—10 mm. wide, rotundate, subtended by several leaves. Bracts of the outer flowers up to 8 mm. long. Bracts of the inner flowers 4—6 mm. long, elliptic or rotundate in the lower half, linear-lanceolate above, pubescent on both sides. Bracteoles 2—4, dissimilar, 2.5—4 mm. long, lanceolate or linear, pubescent on the dorsal surface. Flowers sessile 5—7 mm. long, clothed outside with short, silky, white pubescence ascending upon the ovary and gradually spreading upwards; calyx-tube 2—3.5 mm. deep, cyathiform, lined with a disc up to near the mouth; sepals 1.75—2.5 mm. long, spreading from about the middle, ovate at base, thence linear, glabrous and prominently convex on the inner side. Petals usually absent, sometimes present in an incomplete number, inserted on the upper half of the tube, rarely complete in number, acicular, incurved. Anthers cordate, 1-celled. Ovary widely obconic. Style very stout and short. Stigma distinct, pulvinate.

**South Africa: Cape Province**—PIQUETBERG DIV.: Saron, *Schlechter*



10643.—CLANWILLIAM DIV.: Cedarberg, *Marloth* 2737, *Barnard* 707 (type, in *Bolus* Herb.); Krakadouw Heights, *Pocock* 664, near Middelberg Hut, *Barnes in Bolus* Herb. 19390, *Weintraub in Moss* Herb. 19132, 19135; between Engelsman Kloof and Tafelberg, *Barnes in Bolus* Herb. 19391; Juriesberg, *Compton* 7017.—WORCESTER DIV.: Audensberg, *Esterhuysen* 3215, *Compton* 9771.

The affinity of this species is with *P. odorata*, Schltr. from which it is distinguished by the longer pubescence on the branchlets and by the more prominent, spaced tubercles on the leaves.

132. *P. odorata*, Schltr. in *Engl. Bot. Jahrb.* xxvii, 168 (1899)!

A moderately branched shrub, usually 30—50 cm. high, with wiry, ascending branches. Branchlets rather slender, clothed with short, spreading, grey pubescence. Leaves closely placed, 0.6—1.5 cm. long: lamina ascending or erect-spreading, usually slightly incurved, linear, tipped with an acute callus, rounded or subcordate at base, with closely revolute margins covering the lower surface; upper surface closely and minutely tuberculate-scabrid, clothed with adpressed, grey pubescence, at length becoming glabrous or almost so: petiole 1—2 mm. long. Capitula about 1 cm. wide, hemisphaeric or subglobose, involucrate at base with a few, short, partly expanded leaves. Bracts 4—5 mm. long, ovate, oblong or lanceolate, acute, villous on the outer surface. Bracteoles 2 or 3, 3.5—4 mm. long, linear, villous on the outer surface. Flowers shortly stipitate, 5—6.5 mm. long: calyx-tube 1.5—2.5 mm. deep, cyathiform, cano-pubescent on the outer surface: sepals 2—3.5 mm. long, ovate at base, thence linear and angular-convex, villous on the outer surface. Petals inserted shortly within the mouth of the tube, 0.5—0.75 mm. long, oblanceolate-linear or setaceous, absent from some flowers or incomplete in number in others. Anthers rotundate, 1-celled. Ovary obconic, silky-villous. Style very short and stout. Stigma composed of 3 rounded lobes. Fruit about 6 mm. long, obovate, silky-pubescent, surmounted by a small calyx-base.

**South Africa: Cape Province**—CERES DIV.: Koude Bokkeveld, *Schlechter* 8867, 8907, *Compton* 9724; Knolfontein and Kat Bakkies in the Zwart Ruggens, *Levy* 1846; Bokke River, at the base of the Matroosberg, *Levy* 990; Baviaans Berg, *Stokoe* 6488; Bokkeveld Tafelberg, *Esterhuysen* 3893.—WORCESTER DIV.: De Doorns, *Bolus* 13080; Pienaar's Kloof, *Levy* in *Herb. Dep. Bot., Univ. C. T.* 6248; Bonteberg, *Esterhuysen* 3666.—CLANWILLIAM DIV.: Kromme River, Cedarberg, *Compton* 5067.—LAINGSBURG DIV.: Elandsfontein, *Compton* 3800; crest of the Witteberg, *Compton* 2647.

133. *P. intrusa*, sp. nov. Frutex ramosissimus circiter 60 cm. altus; ramulis pubescentibus; foliis linearibus obtusis basi cordatis supra

laevibus marginibus arte revolutis ; floribus stipitatis in axillis foliorum dispositis extus tomentosus ; bracteolis deficientibus ; tubo late urceolato extus tomentoso ; sepalis detoideis acuminatis ad medium intrusis supra medium patentibus minute puberulisque ; petalis plerumque deficientibus acicularibus vel lanceolatis tubo calycis supra medium insertis ; ovario obconico ; stylo brevi.

A much branched shrub about 60 cm. high, rigid in the lower parts. Branchlets slender, clothed with grey pubescence. Leaves about 5 mm. long : lamina erect-spreading, linear, obtuse, cordate at base, with closely revolute margins covering the lower surface ; upper surface smooth, at first pubescent on the margins : petiole 1—1.5 mm. long. Inflorescence a solitary capituliform spike about 6 mm. long and wide. Flowers 4 mm. long, stipitate in the axils of the upper reduced leaves, clothed outside with white tomentum. Bracteoles absent. Calyx-tube broadly urceolate, 1 mm. deep. Sepals 1.5 mm. long, deltoid, attenuate, very convex above the middle, minutely puberulous on the median angle, erect, abruptly spreading from the middle which projects inwards over the tube. Petals usually absent, occasionally present in an incomplete whorl, acicular or lanceolate, arising on the upper half of the tube. Anthers cordate, 1-celled. Ovary obconic, separated from the tube by a constriction. Style almost 0.5 mm. long. Fruit about 5 mm. long, obovate, with a small calyx-area.

**South Africa: Cape Province**—CERES DIV.: summit of the Roodeberg, alt. 7,000 ft., *Esterhuysen* 1478 (type, in Bolus Herb.), *Compton* 8384.

In the structure of its calyx this species is closely allied to *P. odorata*, *Schltr.* and *P. Maximiliani Schltr.*, but is distinguished from these by the absence of bracteoles and by much smaller flowers.

134. **P. Levynsiae**, sp. nov. Frutex ramosissimus circiter 50 cm. altus ; ramulis dense tomentosus ; foliis lanceolato-oblongis obtusis basi subcordatis supra tuberculatis, marginibus arte revolutis ; capitulis singulis hemisphaericis ; bracteis linearibus utrinque supra medium villosis ; floribus stipitatis extus villosis ; tubo urceolato ; sepalis lineari-lanceolatis supra medium conspicue convexis ad medio barbatis ; petalis deficientibus ; staminibus tubo medio insertis ; ovario turbiniformi ; stylo subulato ; stigmatibus trilobato.

A much branched shrub, about 50 cm. high, with ascending, wiry branches. Branchlets slender, densely tomentose. Leaves closely set, 4—9 mm. long : lamina ascending, lanceolate-oblong, obtuse, subcordate at base, slightly incurved, with closely revolute margins covering the lower surface ; upper surface closely tubercled, at first pubescent, at length glabrous : petiole about 0.5 mm. long. Capitula solitary,

about 1 cm. wide, hemisphaeric, involucred by many modified leaves reaching to shortly above the middle. Bracts 7 mm. long, linear, acute, densely covered on both sides above the middle with long, silvery hairs, villous below on the outer surface, glabrous on the inner. Bracteoles 2, 5—6 mm. long, acicular, silvery-villous on both sides except at the base of the inner side. Flowers stipitate, 5·5—6 mm. long, silky-villous on the outer surface, densely so on the sepals: calyx-tube 3 mm. deep, urceolate: sepals 1·5 mm. long, linear-lanceolate, subacute, flattened at base, sharply convex above, with a short beard depending from the base of the convex portion. Petals absent. Stamens inserted half way up the tube. Anthers cordate, 1-celled. Ovary turbinate. Style 1·25 mm. long, slender. Stigma divided into 3 erect lobes.

**South Africa: Cape Province**—CERES DIV.: east slopes of the Zwart Ruggens, *Levyms* 1771 (in *Bolus Herb.*).

This species much resembles *P. pulchella*, Schltr. but the flowers have a more defined constriction between the tube and the ovary, the larger tube is clothed with different hairs and the sepals are slightly broader and less acute.

135. ***P. alticola***, sp. nov. Frutex erectus paulum ramosus circiter 30 cm. altus; ramulis puberulis supra dense foliatis; foliis linearibus obtusis vel mucronatis basi rotundatis supra laevibus, marginibus tuberculatis arte revolutis; capitulis hemisphaericis; bracteis acicularibus extus villosis; floribus stipitatis extus villosis; tubo urceolato; sepalis deltoideis acuminatis convexis; petalis deficientibus; ovario anguste turbiniformi; stylo brevi.

A moderately branched shrub, about 30 cm. high, with wiry, ascending branches. Branchlets velvety pubescent and sparsely pilose. Leaves closely set, 5—8 mm. long: lamina erect-spreading, slightly incurved, linear, obtuse or tipped with an acute callus, rounded at base, somewhat dorsally compressed, with closely revolute margins covering the lower surface, smooth on the upper surface except for the coarsely tubercled margins, at first pilose on the margins: petiole about 1 mm. long. Capitula solitary, 6—8 mm. wide, hemisphaeric, surrounded by a few leaves, few-flowered. Bracts 4—5 mm. long, acicular, clothed with long, grey hairs on the dorsal surface. Bracteoles about 3 mm. long, setaceous, villous. Flowers stipitate, 2·75—3 mm. long, covered outside with long, white, woolly hairs, glabrous within: calyx-tube 1—1·5 mm. deep, urceolate: sepals 0·5 mm. long, deltoid, acuminate, flattened at the base, angular-convex above. Petals absent. Stamens inserted on the upper half of the tube. Anthers 1-celled. Ovary narrowly turbinate. Style and stigma together about 0·75 mm. high.

**South Africa: Cape Province**—TULBAGH DIV.: Great Winterhoek,

6,500 feet alt., *Compton* 4632 (type, in Bolus Herb.); Sneeuwgat Camp, 3,500 feet alt., *Galpin in Bolus Herb.* 22182.

136. **P. retorta**, sp. nov. Frutex paulum ramosus circiter 40 cm. altus; ramulis pubescentibus sparse villosisque; foliis linearibus obtusis basi rotundatis supra minute tuberculatis, marginibus arte revolutis; capitulis singulis hemisphaericis paucifloris; tubo ampullaceo, ad medio conspicue constrictis extus pubescentibus intus breve pubescente; sepalis lanceolatis infra medium planis barbaticque supra medium convexis; petalis deficientibus; staminibus tubo calycis infra medium insertis; ovario obconico; stylo robusto; stigmatе trilobato.

A moderately branched shrub, about 40 cm. high, with ascending, wiry branches. Branchlets rather slender, clothed with subadpressed, silky pubescence and sparsely villous. Leaves 7—10 mm. long: lamina ascending or erect-spreading, mostly straight, linear, obtuse, rounded at base, semiterete, with closely revolute margins covering the lower surface; upper surface for the most part minutely tubercled and pubescent, at length glabrous; petiole 1—1.5 mm. long. Capitula 1—1.5 cm. wide, solitary, hemisphaeric, comparatively few-flowered and lax, surrounded at base by many leaves. Bracts 5—6 mm. long, linear, attenuate, villous on the outer surface. Bracteoles 2, 2—3 mm. long, acicular, villous. Flowers 7—8 mm. long, stipitate, distinctly constricted between the tube and the ovary: calyx-tube, 3.5—4 mm. deep, ampullaceous, with short pubescence on the inner surface for the most part arranged in vertical rows, covered on the outside with ascending, grey pubescence: sepals 2 mm. long, lanceolate, acute, flattened and bearded on the lower half, sharply convex on the upper, shortly pubescent on the outer surface. Petals absent. Stamens inserted on the lower half of the tube: Anthers reniform, 1-celled. Ovary obconic, densely pubescent. Style 2 mm. long, columnar. Stigma narrow, 3 lobed. Fruit stipitate, 6 mm. long, rotundate, pubescent, with a small calyx-base.

**South Africa: Cape Province**—LAINGSBURG DIV.: Tweedside Ridge, 3,500-4,000 ft., *Compton* 3036 (type, in Bolus Herb.), 3996.—WORCESTER DIV.: Bonteberg, *Esterhuysen* 3658, *Compton* 9894.

A very distinct species which is easily recognised by the ampullaceous calyx-tube pubescent on the inner surface.

137. **P. trachyphylla**, *D. Dietr., Syn. Pl.* i, 875 (1839); *Sond. in Harv. et Sond. Fl. Cap.* i, 492 (1860); **Trichocephalus trachyphyllus**, *Ecklon et Zeyher, Enum.* 131 (1835)!

A much branched shrub, 60—90 cm. high, with ascending, wiry branches. Branchlets rather slender, pilose and very shortly tomentose. Leaves 8—12 mm. long: lamina erect-spreading, slightly incurved,

lanceolate, tipped with an acute callus, rounded at base, with revolute margins covering most of the lower surface; upper surface smooth up the middle, coarsely tubercled and at first pilose on the margins: petiole about 2 mm. long. Capitula 1.3—1.5 cm. wide, hemisphaeric, surrounded by many leaves. Bracts of the outer flowers foliaceous, about 8 mm. long. Bracts of the inner flowers 7—9 mm. long, filiform, densely villous on the outer surface. Bracteoles 2, similar but slightly shorter. Flowers stipitate, 5.5—6 mm. long, densely covered outside with long white hairs: calyx-tube 2 mm. deep, cyathiform: sepals 1.75 mm. long, lanceolate; inner surface convex, with a dense beard of long hairs shortly above the base and down the lower margins, scabridous on the upper parts. Petals inserted on the upper half of the tube, 0.75 mm. long: lamina rotundate, very slightly concave, with long cilia on the upper margin: claw about as long, linear. Anthers 1-celled. Ovary obovate. Style 1 mm. long, columnar. Stigma clavate.

**South Africa: Cape Province**—TULBAGH DIV.: Winterhoek, *Ecklon and Zeyher* 1001, *Bolus* 5147.

138. ***P. Bolusii***, sp. nov. Frutex circiter 50 cm. altus; ramulis pubescentibus dense foliatis; foliis linearibus acuminatis basi obtusis vel attenuatis supra grosse tuberculatis primum villosis, marginibus arte revolutis; capitulis hemisphaericis; bracteis acicularibus; floribus stipitatis extus villosis; tubo cyathiformi; sepalis ovato-lanceolatis acuminatis intus convexis pilis deflexis barbatis; petalis tubo medio insertis, lamina rotundata, cucullata; stylo brevi; stigmatate pulvinato.

A moderately branched shrub, about 50 cm. high, rigid in the lower parts, with wiry, ascending branches. Branchlets with a dense covering of velvety pubescence, sparingly pilose. Leaves crowded, 1.3—2 cm. long: lamina erect-spreading, slightly incurved, linear, tapered towards the apiculate apex, semiterete, rounded or narrowed at base, with closely revolute margins covering the lower surface, upper surface coarsely tubercled, at first pilose, soon becoming glabrous: petiole 2.5—3 mm. long. Capitula mostly solitary, 1—1.5 cm. wide, surrounded by many leaves pilose with buff-coloured hairs. Bracts of the outer series foliaceous, twice as long as the flowers. Bracts of the inner flowers about 8 mm. long, acicular. Bracteoles absent. Flowers stipitate, 5—6 mm. long: calyx-tube about 1.5 mm. deep, cyathiform; outer surface covered with minute tomentum and adpressed, coarse hairs; inner surface glabrous, with a narrow annulus at base: sepals 1.5—1.75 mm. long, ovate-lanceolate, acuminate; outer surface covered with coarse, ascending, buff-coloured hairs; inner surface flat at the base, convex upwards, with an ample beard of pale hairs arranged in lines from the middle to the sinuses. Petals inserted about half way up the tube, 0.5

mm. long : lamina rotundate, cucullate, with several long hairs on the upper margin : claw about as long, linear-oblong. Anthers reniform, 1-celled. Ovary obconic, covered with minute tomentum and adpressed, coarse hairs. Style stout, trigonous, 0.5 mm. high. Stigma depressed-pulvinate. Fruit pedicellate, about 6 mm. long, rotundate, puberulous and pilose, surmounted by a small calyx-base.

**South Africa : Cape Province**—CERES DIV. : base of mountains near Ceres, *Bolus* 8369 (type, in *Bolus Herb.*), *Stokoe* in *Bolus Herb.* 21332 ; slopes at the head of Michell's Pass, *Pillans* 6283, *Barker* 471, *Stokoe* 2052 ; Skilderberg, *Stokoe* 2647 ; Castle Rock, *Stokoe* in *Bolus Herb.* 22338.

The affinity of this species is with *P. trachyphylla*, D. Dietr. from which it may be superficially distinguished by the larger leaf-lamina tubercled over the entire upper surface and by the larger inflorescence.

139. **P. tortuosa**, *E. Mey. ex Harv. et Sond., Fl. Cap.* i, 489 (1860) ! [**P. tortuosa**, *E. Mey. in Drège, Zwei Pfl. Docum.* 211, nomen (1844)].

A much branched, rather rigid shrub about 80 cm. high with ascending, wiry branches. Branchlets shortly tomentose and villous with buff-coloured hairs. Leaves crowded, mostly 5—7 mm. long : lamina erect-spreading, linear, tipped with an acute callus, rounded at base, somewhat incurved, with closely revolute margins covering the lower surface ; upper surface tubercled on the margins, at first pilose on the margins and at the apex, at length glabrous : petiole about 1.5 mm. long, ascending. Capitula about 1.2 cm. wide, hemisphaeric, flat-topped, subtended by many pilose leaves. Bracts 6—9 mm. long, narrowly linear or acicular, clothed with long, white hairs. Bracteoles 2, filiform, 3—5 mm. long. Flowers about 5 mm. long, on a hirsute stipe : calyx-tube about 3 mm. deep, tubular-obconic, sparsely hirsute with long, white, caducous hairs : sepals 1—1.5 mm. long, ovate, densely clothed on the outer surface with ascending, long, white hairs, angular-convex on the upper half of the inner surface. Petals inserted on the upper half of the tube, 0.75 mm. long : lamina orbicular, deeply concave, cucullate : claw very short, cuneate. Anthers elliptic, 2-celled. Ovary narrowly turbinate, sparsely hirsute with long, white, caducous hairs. Style 2.75 mm. long, slender. Stigma slightly clavate.

**South Africa : Cape Province**—PRINCE ALBERT DIV. : rocky places on the Zwartberg, near Klaarstroom, *Drège* 2351 ; Zwartberg, *Forsyth* in *Bolus Herb.* 22348.—UNIONDALE DIV. : Helpmekaar Peak, *Esterhuysen* 4581.

In the living state the calyx is coloured purple on the upper half and pale green on the lower half ; the petals are dark purple ; the anthers and the style together with the stigma are pale green.

140. **P. Maximiliani**, *Schltr. in Engl. Bot. Jahrb.* xxvii, 168 (1899) !

A moderately branched shrub, about 60 cm. high, with ascending, wiry stems. Branchlets slender, shortly cano-tomentose. Leaves closely set, 7—10 mm. long : lamina ascending or erect-spreading, linear, obtuse, rounded at base, almost straight, subterete, with closely revolute margins covering the lower surface ; upper surface closely tubercled, glabrous : petiole about 1 mm. long. Capitula solitary, 1—1.5 cm. wide, many-flowered, widely rounded above, involucred by a few leaves and outer bracts. Inner bracts 6—8 mm. long, lanceolate or linear, puberulous on the outer surface, densely villous on the margins and upper half of the inner surface. Bracteoles 1 or 2, about 6 mm. long, acicular, villous. Flowers 6.5—7 mm. long, stipitate : calyx-tube 2.5 mm. deep, campanulate, with a low cup-shaped disc at base, sparsely tomentose on the outer surface : sepals 2 mm. long, subulate from a broad concave base ; inner surface bearded from the base of the margins upwards, thence around the convexity, scabrid up the middle ; outer surface densely tomentose. Petals inserted half way up the tube, 0.75 mm. long, oblanceolate, obtuse, conspicuously ciliate and slightly incurved at the apex. Anthers 1-celled. Ovary obconic, densely villous. Style stout, 0.75 mm. long. Stigma 3-humped.

**South Africa : Cape Province**—CLANWILLIAM DIV. : Pakhuis Mountain, *Schlechter* 8660.

141. **P. pulchella**, *Schltr. in Engl. Bot. Jahrb.* xxvii, 169 (1899)!

A much branched shrub, 40—60 cm. high, with ascending, wiry branches. Branchlets minutely tomentose and sparsely pilose. Leaves closely set, 5—8 mm. long, ascending : lamina lanceolate or oblong-lanceolate, acute or obtuse, subcordate or cordate at base, with closely revolute margins covering the lower surface ; upper surface minutely tubercled up the middle, coarsely tubercled and, at first, villous on the margins : petiole about 1 mm. long. Capitula about 1.5 cm. wide, hemisphaeric, subtended by many expanded, villous leaves and consisting in the outer part of villous, foliaceous bracts. Bracts of the inner series 8—10 mm. long, linear or acicular, densely villous on the margins, villous or pubescent on the upper half of both sides or nearly glabrous on both sides. Bracteoles sometimes present, about 4 mm. long, setaceous, villous on the margins and upper parts. Flowers 5—6 mm. long, tapered at base into a stipe 1—1.5 mm. long : calyx-tube 2 mm. deep, broadly obconic up to the middle, thence slightly narrowed to the mouth, shortly tomentose on the outer surface, glabrous within, with a cup-shaped disc at the base : sepals 1.5 mm. long, lanceolate from a deltoid base ; inner surface convex and scabridous on the upper half and down the sides, bearded from the sinuses inwards and upwards to about the middle ; outer surface hirsute with long, white, spreading

hairs. Petals absent. Anthers 1-celled. Ovary narrowly obconic, shortly tomentose. Style 1.25 mm. long, columnar. Stigma divided into 3 stout lobes. Fruit about 6 mm. long, narrowly rotundate, puberulous on the upper parts, red-brown, with a narrow remnant of the calyx and dark brown longitudinal lines.

**South Africa : Cape Province**—CERES DIV. : De Straat, *Esterhuysen* 6521.—CLANWILLIAM DIV. : Kerskop on the Cedarberg, *Schlechter* 8792 ; Cedarbergen, *Pattison in Bolus Herb.* 13922 ; Wupperthal, *Leipoldt* 486, *Marloth* 7408 ; Kromme River, *Compton* 5053 ; east end of Elands Kloof, *Esterhuysen* 3960.—CALVINIA DIV. : Nieuwoudtville, *Leipoldt in Bolus Herb.* 21994.

142. **P. rigida**, *Ecklon et Zeyher, Enum.* 133 (1835)! ; *D. Dietr., Syn. Pl.* i, 875 (1839) ; *Fl. Univ. N. Folge* tab. 51 (1849) ; *Sond. in Harv. et Sond. Fl. Cap.* i, 490 (1860) : **Walpersia rigida**, *Presl, Bot. Bermerk.* 38 (1844) absque descr.

A moderately branched shrub, about 60 cm. high, rather stout in the lower parts, with ascending, often virgate branches. Branchlets wiry, covered with grey tomentum, which persists through many years, and having longer, spreading, silky hairs intermixed with the tomentum. Leaves closely set, sometimes very crowded, 1—2.5 cm. long : lamina erect-spreading or spreading, incurved, linear-lanceolate, attenuate, subcordate at base, with closely revolute margins covering the lower surface ; upper surface smooth except for slightly raised tubercles on the margins, at first pilose with long, white hairs on the margins and up the midrib : petiole 1.5—3 mm. long. Capitula usually solitary, about 2 cm. wide, rotundate ; the outer portion composed of a dense involucre of pilose, slender leaves. Bracts 1—1.3 cm. long, filiform, curved and twisted, plumose. Bracteoles 2, similar but shorter. Flowers stipitate, about 8 mm. long : calyx-tube 1.25—1.75 mm. deep, cyathiform, villous on the outer surface or almost glabrous on the lower parts, glabrous within, with a shallow cup-shaped disc : sepals 4—4.5 mm. long, lanceolate, acuminate, somewhat recurved above the middle, villous with long, white hairs on the outer surface ; inner surface flat in the lower half, angular-convex in the upper, puberulous from the apex down the ridge to about the middle where the hairs suddenly become longer and a beard of straight hairs arises, the margins being villous down to the sinuses. Petals absent. Stamens inserted shortly within the mouth of the tube. Anthers 1-celled. Ovary very narrowly turbinate, tapered at base into a stipe, constricted at the top, obscured by a dense growth of hairs arising from between the flowers, sparsely or amply clothed with deciduous straight or woolly hairs. Style 1.25—1.5 mm. long, slender. Stigma capitate.



**South Africa: Cape Province**—CERES DIV.: Rosendal, *Compton*; North Cold Bokkeveld, *Compton* 9710.—CLANWILLIAM DIV.: Cedarberg, *Ecklon and Zeyher* 1024; Long Kloof, *Bolus* 5612; Tafelberg, *Barnard in S. Afr. Mus. Herb.*; Sneeuwberg, *Pocock* 400; Welbedacht Kloof, *Weintraub in Bolus Herb.* 19388; Elands Kloof, *Lewis in Bolus Herb.* 21958; Kromme River, *Compton* 5056; Wabooms River, *Compton* 6523.

143. *P. Marlothii*, sp. nov. Frutex paulum ramosus rigidus circiter 60 cm. altus; ramulis pubescentibus villosisque dense foliatis; foliis anguste linearibus obtusis vel apiculatis basi subcordatis vel rotundatis supra tuberculatis, marginibus arte revolutis primum villosis; capitula hemisphaericis; bracteis setaceis extus villosis; floribus conspicue stipitatis extus grosse pilosis; tubo urceolato intus sparse pubescente supra medium, disco annulato; sepalis deltoideis acuminatis supra medium convexis ad medio barbatis; petalis deficientibus; staminibus tubo calycis insertis; ovario anguste obconico; stylo subulato.

A moderately branched, rather rigid shrub about 60 cm. high. Branchlets wiry, velvety-pubescent and villous. Leaves closely set, 1.3—1.5 cm. long; lamina ascending or erect-spreading, narrowly linear, obtuse or apiculate, subcordate or rounded at base, semiterete, with closely revolute margins covering the lower surface, coarsely or obsoletely tubercled on the upper surface, at first villous on the margins and midrib, becoming glabrous; petiole 3—4 mm. long. Capitula about 1.5 cm. wide, hemisphaeric, surrounded by many villous leaves. Bracts about 1 cm. long, arising upon the pedicel, setaceous, villous on the outer surface. Bracteoles 2, similar to the bracts, 6—7 mm. long. Flowers 7—8 mm. long, on a pedicel about 1 mm. long, covered outside with long, ascending, rather coarse hairs; calyx-tube 4—4.5 mm. deep, urceolate; inner surface sparsely pubescent on the upper half or glabrous, with the disc raised into a small annulus closely encircling the style; sepals 1.75—2 mm. long, deltoid, acuminate, flattened on the lower half of the inner surface, angular convex on the upper, with a dense woolly beard extending from the middle down to the sinuses. Petals absent. Stamens inserted at or shortly below the middle of the tube. Anthers cordate, 1-celled. Ovary narrowly obconic. Style 1.5 mm. long.

**South Africa: Cape Province**—LAINGSBURG DIV.: Witteberg, *Marloth* 2959 (type, in *Bolus Herb.*), *Compton* 2591, *Barker in Bolus Herb.* 20611, *Walgate* 249.

**Var.  $\beta$ , *Levynsiae***; bracts of the outer flowers 1—1.5 cm. long, considerably overtopping the flowers; flowers 6 mm. long; tube 3—3.5 mm. deep, glabrous on the inner surface; sepals 1.5—2 mm. long; style 0.75 mm. long.

**Cape Province**—WORCESTER DIV. : lower north slopes of the Matroosberg, *Levyms* 991 (in Bolus Herb.).

**Var.  $\gamma$ , crassa** ; bracts of the outer flowers about 1.5 cm. long, considerably overtopping the flowers, densely villous ; pedicels 2—2.5 mm. long ; disc at the base of the tube conspicuously swollen and elevated so as to form a narrow annulus almost touching the style.

**Cape Province**—CLANWILLIAM DIV. : Pakhuis Pass, *Compton* 6953 (type, in Bolus Herb.).—CERES DIV. : Karooport, *Bond* 410.

This species is most nearly related to *P. aemula*, Schltr. from which it differs by larger flowers and differently shaped sepals.

144. **P. Leipoldtii**, sp. nov. Frutex ramosus circiter 50 cm. altus ; ramulis pubescentibus dense foliatis ; foliis linearibus obtusis vel callosacutis basi obtusis supra minute scabridis appresse pubescentibus, marginibus pilosis arte revolutis ; capitulis singulis hemisphaericis ; bracteis anguste linearibus plumosis ; bracteolis deficientibus ; floribus subsessilibus ad medium constrictis extus villosis ; tubo anguste cyathiformi ; sepalis lanceolatis acuminatis infra medium barbatis supra medium convexis ; petalis deficientibus ; ovario turbinato ; stylo subulato.

A moderately branched shrub, about 50 cm. high, with wiry, ascending branches. Branchlets slender, velvety-pubescent and sparsely pilose. Leaves closely set, 1—1.5 cm. long : lamina erect-spreading, slightly incurved, linear, obtuse or tipped with an acute callus, rounded at base, semiterete, with closely revolute margins covering the lower surface or almost so ; upper surface minutely scabrid, clothed with short, adpressed, persistent pubescence, pilose on the margins : petiole 1.5—2 mm. long. Capitula solitary, 1—1.5 cm. wide, hemisphaeric, surrounded by many densely pilose leaves. Bracts 9—10 mm. long, narrowly linear, plumose. Bracteoles absent. Flowers subsessile, 8—9 mm. long, densely silky-villous and shortly tomentose on the outer surface, constricted between the tube and the ovary : calyx-tube about 3 mm. deep, narrowly cyathiform, glabrous within : sepals about 3 mm. long, lanceolate, acuminate, flattened at the base, sharply convex above, with a long beard on the middle portion of the lower half extending into the sinuses. Petals absent. Stamens inserted on the lower half of the tube. Anthers 1-celled. Ovary turbinate. Style 1.5 mm. long, columnar, encircled at base by a small annulus. Stigma conical. Fruit 5 mm. long, rotundate, pubescent and villous, red-brown, with a very small calyx-base upon the summit.

**South Africa : Cape Province**—CLANWILLIAM DIV. : between Honing Vlei and Wupperthal, 2,600 ft., *Leipoldt* 643 (type, in Bolus Herb.). CERES DIV. : Ceres Wild Flower Show, *Compton* 5063.

Pubescent leaves and much longer and narrower sepals distinguish this species from *P. aemula*, Schltr. to which it is closely related.

145. *P. altigena*, Schltr. in *Engl. Bot. Jahrb.* xxvii, 167 (1899)!

A much branched shrublet : branches ascending, wiry, shortly grey-tomentose and sparingly pilose. Leaves 5—8 mm. long : lamina erect-spreading, slightly incurved, linear, callus-acute or obtuse, with revolute margins covering the lower surface ; upper surface finely tuberculate-scabrous, pilose with soft, grey hairs, becoming glabrous : petiole about 1 mm. long, ascending, tomentose. Capitula solitary or 2 approximate on short branchlets, 1—1.5 cm. wide, hemisphaeric, surrounded by many, strongly ciliate leaves. Bracts about 7 mm. long, linear, recurved above the middle, glabrous on both sides of the lower half, grey-villous on both sides of the upper. Bracteoles absent. Flowers 4.5—5 mm. long : tube 1.75 mm. deep, cyathiform ; the outer surface glabrous on the lower parts, sparsely villous on the upper ; inner surface glabrous, with a cup-shaped disc at the base : sepals 1.5 mm. long, erect-spreading, lanceolate, acuminate ; outer surface grey-villous ; inner surface flattened on the lower half, convex on the upper, bearded with long hairs at the middle and thence down the margins to the base. Petals inserted half way up the tube, 0.5 mm. long, linear, incurved over the anthers, tipped with a long flat hair. Anthers reniform, 1-celled. Ovary obconic, grey-villous. Style 0.5 mm. long, stout. Stigma conical, 3-umbonate.

**South Africa : Cape Province**—TULBAGH DIV. : mountains near Saron, *Schlechter* 10661.—CLANWILLIAM DIV. : Koudeberg, *Schlechter* 8735.

146. *P. plumigera*, sp. nov. Frutex paulum ramosus circiter 40 cm. altus ; ramulis villosis tomentosisque dense foliatis ; foliis linearibus obtusis vel apiculatis basi rotundatis supra paulum tuberculatis, marginibus arte revolutis ; capitulis singulis hemisphaericis ; bracteis setaceis plumosis ; floribus conspicue stipitatis extus villosis ; tubo anguste obconico ; sepalis deltoideis acuminatis ad medio barbatis supra medium convexis ; petalis deficientibus ; staminibus tubo calycis supra medium insertis ; ovario anguste obconico ; stylo subulato ; stigmatum capitato.

A sparsely branched shrub, about 40 cm. high, with ascending, wiry branches. Branchlets slender, villous and shortly tomentose. Leaves very closely set, 0.7—1.5 cm. long : lamina erect-spreading, linear, obtuse or tipped with an acute apiculus, rounded at base, semiterete, with closely revolute margins covering the lower surface, with scattered tubercles and at first pilose over the upper surface : petiole about 1 mm. long. Capitula solitary, about 1.5 cm. wide, hemisphaeric, surrounded by several series of strongly ciliate leaves. Bracts of the outer flowers

about 1.5 cm. long, acicular, recurved, plumose with white hairs, much overtopping the flowers. Bracts of the inner flowers about 1 cm. long, setaceous, plumose, straight, not overtopping the flowers. Bracteoles of the outer flowers solitary, absent from the inner flowers. Flowers 8—9 mm. long, on a well developed, villous stipe, covered outside with long, ascending, silky, grey hairs: calyx-tube 5—5.5 mm. deep, tubular-obconic, tapered at base, slightly constricted at the mouth, glabrous within, purple on the upper half: sepals 1.25—1.5 mm. long, deltoid, acuminate, considerably exceeded by the hairs on the outer surface; inner surface rounded-convex and minutely scabrid on the upper half, deltoid and flattened in the lower half, with a beard of straight, fulvous hairs at least 1 mm. long dependent from the middle of the sepal. Petals absent. Stamens inserted on the upper half of the tube. Anthers reniform, 1-celled. Ovary narrowly obconic. Style 2 mm. long, slender. Stigma capitate.

**South Africa: Cape Province**—CLANWILLIAM DIV.: Koudeberg, near Wuppertal, 3,200 ft., *Bolus* 8962, *Weintraub in Moss Herb.* 19134; near Middelberg, *Levy's* 2902; between Middelberg Hut and Crystal Pool, 4,000 ft. *Barnes in Bolus Herb.* 19389 (type); Juriesberg, *Compton* 7026.

This species closely resembles *P. affinis*, Sond. and *P. aemula*, Schltr. but is distinguished from the former by much shorter, deltoid, acuminate sepals and the absence of petals, and from the latter by its larger flowers, deltoid, acuminate sepals and longer beards.

147. *P. aemula*, Schltr. in *Engl. Bot. Jahrb.* xxvii, 166 (1899)!

A much branched shrub about 30 cm. high, rigid in its lower parts. Branchlets wiry, covered with short grey tomentum and with scattered villi. Leaves crowded, 0.8—1.3 cm. long: lamina erect-spreading, somewhat incurved, linear, obtuse, with revolute margins almost entirely covering the lower surface: upper surface tubercled on the margins and midrib and at first pilose on those parts: petiole 1.5—2 mm. long, villous. Capitula solitary, 1.2—1.5 cm. wide, hemisphaeric, surrounded at base by normal leaves and leaves with greatly enlarged petioles. Bracts 1.2—1.4 cm. long, acicular, densely covered on the outer surface with straight, white hairs. Bracts of the outer series considerably overtopping the flowers. Bracteoles 2, about 6 mm. long, filiform, plumose with long, white hairs. Flowers 5.5—6.5 mm. long (exclusive of the hairs), distinctly stipitate, covered on the outer surface with long, straight, persistent, white hairs: calyx-tube 3.5—4 mm. deep, tubular-obconic, glabrous within: sepals erect-spreading, 1 mm. long, deltoid, acute; outer surface densely covered with ascending, straight, white hairs 1—1.25 mm. long; inner surface flattened in the lower half, with a

purplish, woolly bearded across the middle and down the sides, angular-convex and scaberulous in the upper half. Petals absent. Stamens inserted half-way up the side of the tube. Anthers 1-celled. Ovary narrowly obconic. Style 1 mm. long, slender. Stigma capitate. Fruit about 6 mm. long, on a villous stipe, rotundate, sparsely pilose, light brown with 6—8 longitudinal red-brown lines and a small calyx-area.

**South Africa: Cape Province**—CERES DIV.: Koude Bokkeveld, *Schlechter* 8904; Baviaansberg, *Stokoe* 6509; Ceres Flower Show, *Marloth* 6187.—CALVINIA DIV.: Nieuwoudtville, *Leipoldt in Nat. Herb., Pretoria*.

**Var.  $\beta$ , multibracteolata** (*Pillans* var. nov.); capitula 1.5—2 cm. wide. Bracts 6—7 mm. long, not exceeding the flowers. Bracteoles 4, 5—6 mm. long.

**Cape Province**—CERES DIV.: Ceres Flower Show, *Compton* 3699 (type, in Bolus Herbarium).

148. **P. affinis**, *Sond. in Harv. et Sond. Fl. Cap.* i, 489 (1860)!

A wiry shrub, 30—40 cm. high, moderately branched. Branchlets ascending, covered with short, grey tomentum and occasional long hairs. Leaves crowded, 0.8—1.3 cm. long: lamina erect-spreading, mostly straight, linear, obtuse, rounded at base, with closely revolute margins covering the lower surface; upper surface tubercled on the margins, pilose on the midrib and margins, becoming glabrous: petiole 0.75—1 mm. long. Capitula solitary, about 1.5 cm. wide, hemisphaeric, surrounded by many leaves and with long, plumose bracts on the outer margin. Bracts distinctly overtopping the flowers, 1—1.7 cm. long, acicular, grey-villous, the outer longer than the inner. Bracteoles absent or rarely 1 present. Flowers 9 mm. long, on a villous pedicel about 1.5 mm. long, densely covered outside with short, grey tomentum and long, ascending hairs: calyx-tube about 3 mm. deep, narrowly cyathiform, glabrous within, with a disc lining the base and raised around the base of the style into a conspicuous annulus: sepals erect-spreading, 4 mm. long, deltoid and flattened at base, thence subulate, acuminate, with a dense beard of grey hairs arising upon the sides at the base. Petals inserted on the lower half of the tube, rarely absent from some flowers, 0.75 mm. long, linear-oblongate, not clawed, almost flat, with 1—4 distinct hairs on the apical margin. Anthers 1-celled. Ovary narrowly obconic. Style slender, 1—2 mm. long. Stigma clavate, distinctly lobed.

**South Africa: Cape Province**—VAN RHYN'S DORP DIV.: top of Van Rhy'n's Pass, *Galpin in Bolus Herb.* 21341, *Salter* 4480, 4567.—CALVINIA DIV.: between Grasberg River and Waterval, *Drege* 6783.

149. **P. barbata**, sp. nov. Fruticulus paulum ramosus; ramulis

pubescentibus dense foliatis ; foliis linearibus subacutis basi rotundatis supra grosse tuberculatis, marginibus arte revolutis ; capitulis singulis hemisphaericis ; bracteis acicularibus valde pilosis ; floribus pedicellatis extus pilosis ; tubo urceolato ; sepalis lanceolatis acuminatis supra medium convexis infra medium barbatis ; petalis deficientibus ; staminibus tubo calycis infra medium insertis ; ovario ovato ; stylo subulato ; stigmatate capitato.

A dwarf, moderately branched shrub, rigid at base. Branchlets wiry, velvety pubescent and sparsely pilose. Leaves very crowded, subimbricate, 1—1.4 cm. long ; lamina ascending or erect-spreading, slightly incurved, linear, narrowed towards the apex, tipped with an acute callus, rounded at base, with closely revolute margins covering the lower surface ; upper surface coarsely tubercled, at first pilose, becoming glabrous : petiole 1—2 mm. long. Capitula solitary, 2—2.5 cm. wide, hemisphaeric, surrounded by many rigidly ciliate leaves. Bracts about 1.5 cm. long, acicular, amply pilose with spreading, grey hairs. Bracteoles 2, about half as long, filiform, plumose. Flowers pedicellate, 9—10 mm. long. Pedicels 2—2.5 mm. long, stout, with many, long, ascending hairs mostly geniculate at base. Calyx-tube 3 mm. deep, urceolate ; outer surface sparsely pilose, with 10 indistinct longitudinal ridges on the upper half ; inner surface glabrous, with a small annulus at the base. Sepals 3.5—4.5 mm. long, lanceolate, acuminate, clothed on the outer surface with many, long, spreading, white hairs mostly twisted or geniculate near the base ; inner surface flattened in the lower half, prominently convex on the upper, bearded from about the middle down the margins. Petals absent. Stamens inserted on the lower half of the tube. Anthers reniform, 1-celled. Ovary ovate, sparsely pilose. Style about 1.5 mm. long, slender. Stigma capitate, entire. Fruit about 6 mm. long, rotundate, glabrous or sparsely pilose about the summit, surmounted by a small calyx-base.

**South Africa : Cape Province**—CLANWILLIAM DIV. ; Koudeberg, near Wupperthal, *Schlechter* 8737 (type, in Bolus Herb.), *Bolus in Bolus Herb.* 21342.

#### IMPERFECTLY KNOWN SPECIES.

150. *P. divaricata*, *Vent., Jard. Malm.* sub tab. 57, obs. 2 (1803) ; *DC., Prodr.* ii, 37 (1825) ; *Don, Gen. Syst.* ii, 42 (1832).

Branches elongate, decumbent. Leaves few, lanceolate, flattened, somewhat villous on the upper surface, roughly velvety on the lower surface.

The habitat of this species is unknown. It was cultivated at Malmaison. De Candolle and Don thought it might be the same as *P.*

*paniculata*, Willd., but as Ventenat did not mention the flowers, and as no material seems to have been preserved this species remains doubtful.

***Soulangia glauca***, Hort. ex A. Dietr. in Otto et Dietr. *Allg. Gartenz.* vii, 388 (1839).

Leaves very shortly petiolate, 1.3 cm. long, 0.3—0.6 cm. wide, linear-lanceolate, acute, revolute at the margins, glabrous and shining on the upper surface, white-tomentose on the lower surface. Flowers unknown.

The habitat is unknown. There does not seem to be any preserved material of this species.

Species published without descriptions and without indications as to the types.

***Phyllica acuminata***, Noisette ex Steud. *Nomen.* 614 (1821) et ed. 2, ii, 325 (1841).

***P. asperulata***, Wender ex Steud. *Nomen.* ed. 2, ii, 325.

***P. australis***, Noisette ex Steud. *Nomen.* ed. i, 614.

***P. cordifolia***, Lam. ex Steud. *Nomen.* ed. i, 614.

***P. lancifolia***, Steud., *Nomen.* ed. 2, ii, 326.

***P. linearis***, Desf. *Tabl. de L'Ecole* ed. 2, 232 (1815).

***P. longirostrata***, Hort. ex Steud. *Nomen.* ed. 2, ii, 326.

***P. madagascariensis***, Reiss. ex Engl. *Pflanzenw.* ix, 314, obs. (1921).

***P. oblongifolia***, Hort. ex Steud. *Nomen.* ed. 2, ii, 326.

***P. ovata***, Hort. l.c.

***P. virgata***, Wender ex Steud. *Nomen.* ed. 2, ii, 326.

#### SPECIES EXCLUDED FROM PHYLICA.

***P. abietina***, E. Mey. in Drège *Zwei Pfl. Doc.* 210 (1844)=***Spatalla barbiger***, Kn.

***P. cotonifolia***, Portenschl. ex Reiss. in Endl. *Nov. Stirp. Dec.* 79 (1839)=***Nesiota elliptica***, Hook. f.

***P. elliptica***, Rozb. in Beats. *Trans. St. Helenae* 316 (1816)=***Nesiota elliptica***, Hook. f.

***P. elongata***, Willd. ex Roem. et Schultes *Syst. Veg.* v, 491 (1819)=***Staaavia globosa***, Sond.

***P. globosa***, Thunb., *Diss.* 8 (1804)=***Staaavia globosa***, Sond.

***P. imbricata***, Thunb., *Prodr. Cap.* 45 (1794)!=***Brunia cordata***, Sond.

***P. leucocephala***, Cordem., *Fl. Ile Réunion* 414 (1895)=***Blaeria leucocephala***, Berg.

***P. mucronata***, E. Mey. in Drège *Zwei Pfl. Doc.* 211 (1844)=***Stilbe mucronata***, N. E. Br.

***P. nuda***, Burm. f., *Fl. Cap. Prodr.* 6 (1768)=***Staaavia radiata***, Dahl!

**P. pinifolia**, *Linn. f., Suppl.* 153 (1781)=**Brunia pinifolia**, *Brongn.*

**P. racemosa**, *Linn., Mant.* ii, 209 (1771)!; *Syst. Veg.* ed. 13, 196 (1774); ed. 14, 235 (1784); *Thunb., Prodr. Cap.* 45 (1794); *Willd., Sp. Pl.* i, 1112 (1798); *Thunb., Fl. Cap. ed. Schultes* 202 (1823); *Spreng., Syst. Veg.* i, 829 (1825); *Richter, Sp. Pl.* 212 (1840)=**Brunia lancifolia**, *Walp.*

**P. radiata**, *Linn., Cent.* i, 8 (1755); [**Chrysanthemum ericoides**—*Breyn. Cent.* 165, tab. 82 (1678); *Pluk., Mant.* 47, tab. 454, fig. 7 (1700)] in *Amoen. Acad.* iv, 268 (1759); *Sp. Pl.* ed. 2, 283 (1763)=**Staavia radiata**, *Dahl.*

**P. scandens**, *Sesse et Moc., Pl. N. Hispan.* ed. i, 39 (1887-1890). This species is recorded as a native of Mexico, but no true *Phyllica* is known to be a native of the American Continent.

**P. squamosa**, *Willd. ex Roem. et Schultes Syst. Veg.* v, 491 (1819); *DC., Prodr.* ii, 37 (1825)=**Raspalia passerinoides**, *Oliv. var. robusta* (*Dümmer*).

**P. thysophora**, *Steud., Nomen.* ed. 2, ii, 326 (1841)=**Brunia pinifolia**, *Brongn.*

**P. trichotoma**, *Thunb., Prodr. Cap.* 187 (1794); *Fl. Cap. ed. Schultes* 201 (1823); *DC., Prodr.* ii, 37 (1825); *Spreng., Syst. Veg.* i, 827 (1825)=**Staavia globosa**, *Sond.*

**P. verticillata**, *D. Dietr., Syn. Pl.* i, 875 (1839) [**Trichocephalus verticillatus**, *Ecklon et Zeyher, Enum.* 131 (1835)]=**Stilbe mucronata**, *N. E. Br.*



PLATE 1. Flowers of *Phylica* spp. in longitudinal section and petals, all  $\times 5$ .

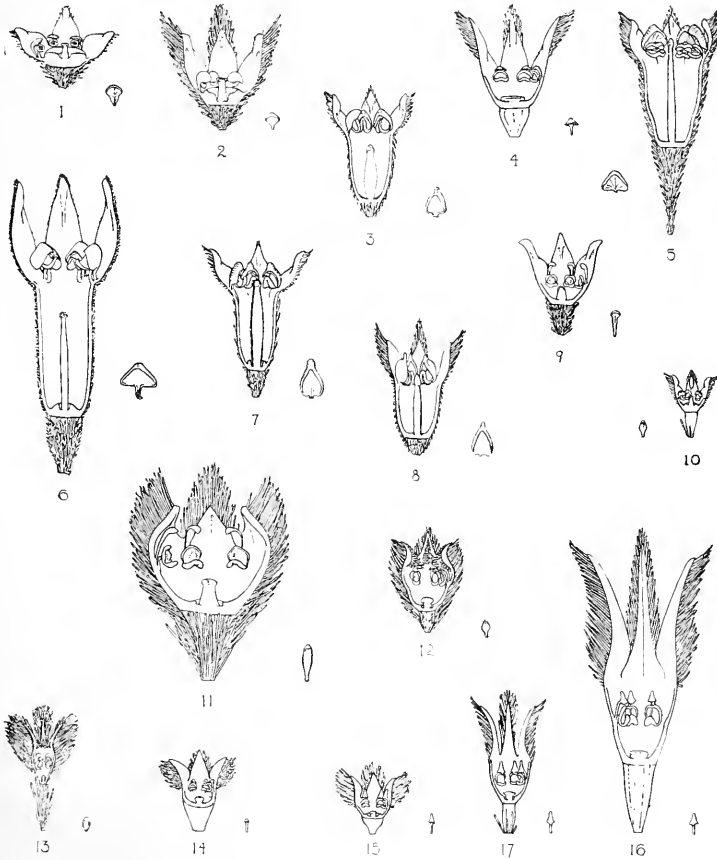


Fig. 1. *P. paniculata*. Fig. 2. *P. arborea*. Fig. 3. *P. imberbis*. Fig. 4. *P. callosa*.  
 Fig. 5. *P. Willdenowiana*. Fig. 6. *P. gnidioides*. Fig. 7. *P. velutina*. Fig. 8.  
*P. excelsa*. Fig. 9. *P. Greyii*. Fig. 10. *P. minutiflora*. Fig. 11. *P. emirnensis*.  
 Fig. 12. *P. Thunbergiana*. Fig. 13. *P. Keetii*. Fig. 14. *P. ericoides*. Fig. 15  
*P. disticha*. Fig. 16. *P. propinqua*. Fig. 17. *P. gracilis*.

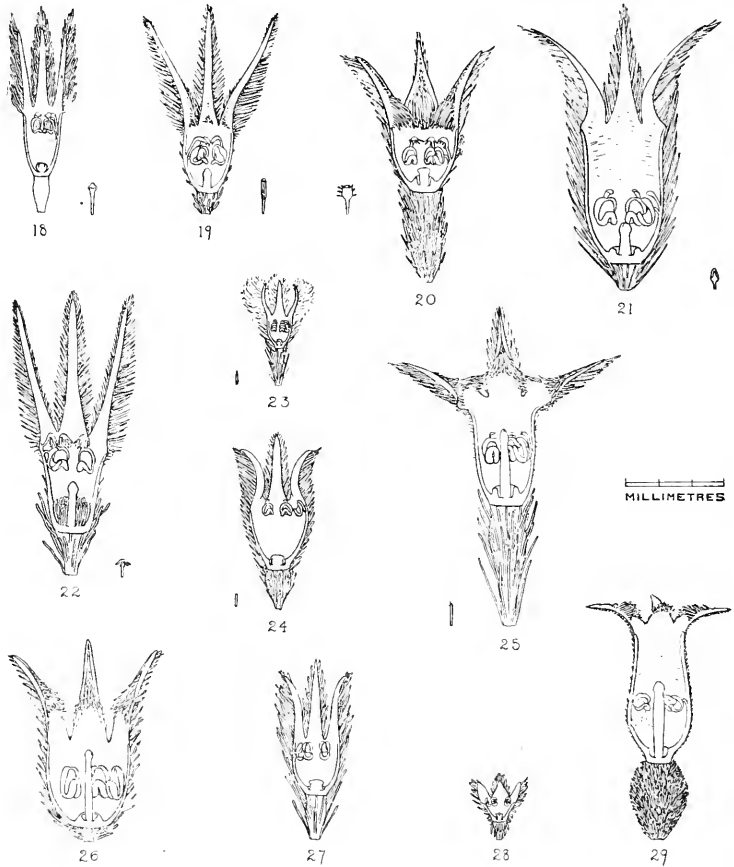
PLATE 2. Flowers of *Phytica* spp. in longitudinal section and petals, all  $\times 5$ .

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SOME NEW ALOE SPECIES FROM CENTRAL AND  
EAST TROPICAL AFRICA.

SERIES II.

By H. BASIL CHRISTIAN.

(With Plates I-VIII.)

**Aloe Boscawenii** Christian, sp. nov. in Sect. *Prolongatae*. Habitus affinis est *A. Cameronii* Hemsl. sed foliis glaucis recurvatis, inflorescentia ramosiora, colore formaque florum differt. Quoad inflorescentiam affinis est *A. Volkensii* Engl. sed racemis cylindricis et colore florum recedit.

Planta fruticosa, e basi ramosa, caules usque l. m. alti, 5—7 cm. diam., laxe foliati. *Folia* viridia, immaculata, juniora erecto-patentia recurvula, seniora patentia, recurvata, ovato-lanceolata, 44—50 cm. longa, basi 8 cm. lata, supra canaliculata, subtus rotundata; ad margines linea tenui cartilaginea cincta, dentibus deltoideis patentibus 1—3 mm. longis et 7—18 mm. distantibus armata, interstitiis rectis. *Inflorescentia* erecta, supra medium ramosa, ca. 90 cm. alta. *Pedunculus* brunneo-viridis, lateraliter compressus, 2 cm. diam. *Bractee* ramos subtendentes, deltoideo-acutae, 10 mm. longae, basi 10 mm. latae, 10-nervatae, scariosae. *Rami* 5—7 erecto-patentes, superiores arcuato-erecti, inferiores sub-ramosi. *Racemi* cylindrici, 10—12 cm. longi, 7 cm. diam., superne densi, subtus laxiusculi, gemmae virides, flores flavi. *Bractee* longe-acuminatae, 7 mm. longae, basi 3 mm. latae, 3-nervatae, scariosae. *Pedicelli* 13 mm. longi, erecto-patentes. *Perianthium* flavum, basi stipitatum, cylindricum, rectum, supra ovarium 9 mm. diam., medium versus vix constrictum, faucem, versus leviter contractum, lateraliter compressum; segmenta exteriora per 18 mm. libera, flava, apicem versus brunnescentia, 3-nervata, ad apices sub-acuta, leviter patentia; segmenta interiora ad basin libera, concolores,

3-nervata, ad apices obtusiora, vix patentia. *Filamenta* pallide flava, exserta. *Antherae* exsertae, tandem inclusae. *Stylus* flavus, inclusus, interdum exsertus. *Ovarium* 5 mm. longum, 3 mm. diam. *Habitat*: Tanganyika Territory, Tanga Coast. No. 902 in Herb. Christian (type).

This Aloe is one of a fine collection of Aloe spp. kindly sent me in 1937 by Col. The Hon. M. T. Boscawen, D.S.O., M.C., of Mtotohovu, Tanga, in whose honour I have much pleasure in naming it. With its striking looking racemes, soft green above, gradually changing to yellow below, as the flowers develop, it is an addition to any Aloe garden and has the further advantage of a long flowering period, throwing up inflorescences at short intervals from early in February into May.

In habit of growth it is much akin to *A. Cameronii* Hemsl., but the leaves are more channelled, not at all glossy, and never change their colour to red or copper in the dry season. The inflorescence bears no resemblance to that of *A. Cameronii* which is usually simple, bifurcate, or with 3—4 ascending branches, and the floral characters are entirely different in the two species. The inflorescence of our new sp. is perhaps nearest to that of *A. Volkensii* Engl.: the habit is very similar and apart from the difference in colour of the flowers which in *A. Volkensii* is red, and the shorter perianth tubes, there is very little difference between the flowers of the two spp. *A. Cameronii* and *A. Volkensii* only flower once during the season.

The photograph (Plate I) is of a young plant which was in flower in the garden at Ewanrigg, S. Rhodesia on 2.2.39.

*Description*: Fruticose, branched from the base. *Stems* up to 1 m. high and 5—7 cm. diam., laxly foliate. *Leaves* light green, immaculate, the younger erect-spreading, slightly recurved, the older spreading recurved, ovate-lanceolate, 44 to 50 cm. long, 8 cm. broad at the base, the upper surface channelled, striate, the lower surface rounded; margins with a narrow cartilaginous line armed with brown-tipped deltoid spreading pungent teeth, 2 mm. long low down, 3 mm. long above, 7 mm. apart above the base, 18 mm. apart towards the apex, interspaces straight, the teeth occasionally bifid. *Inflorescence* erect, branched from above the middle, ca. 90 cm. high. *Peduncle* brownish-green, laterally compressed, with a distinct rib on each side, 2 cm. diam. on the long axis low down. *Bract* subtending the lowest branch deltoid-acute, 10 mm. long, 10 mm. broad at the base, 10-nerved, scariosus. *Branches* 5—7, the lower erect-spreading, usually sub-branched, 7 mm. diam., the upper arcuate-spreading, shorter than the terminal, usually with one sterile bract. *Racemes* cylindric, rounded at the apex, 10—12 cm. long, 7 cm. diam., rather lax below, dense above usually with 2—3 flowers at some distance below the raceme, the buds erect-spreading, dull soft green



gradually changing to yellow, the mature flowers sub-pendulous. *Floral bracts* long acuminate, 7 mm. long, 3 mm. broad at the base, 3-nerved, scarious. *Pedicels* green, erect-spreading, those of the mature flowers sub-cernuous, 18 mm. long. *Perianth* cylindric, straight, yellow shading to brownish at the apex, stipitate, 30 mm. long, 9 mm. diam. over the ovary, hardly constricted towards the middle, slightly contracted towards the throat, laterally compressed to 7 mm. diam., outer segments free for 18 mm., yellow shading to brownish at the apex, 3-nerved, the upper segments straight, the apices sub-acute, slightly spreading, the lower segments curved upwards, hardly spreading at the apices; inner segments the same colour as the outer, free to the base, 3-nerved, the apices slightly spreading, sub-obtuse. *Filaments* pale yellow, just exerted. *Anthers* brown, 3 mm. long, at length withdrawn into the perianth. *Style* yellow, included or, sometimes, at length exerted. *Ovary* pale green, slightly elliptical in outline, 5 mm. long, 3 mm. diam.

**Aloe flexilifolia** Christian sp. nov.

Planta succulenta, fruticosa. *Caules* foliati. *Folia* griseo-glauca, immaculata, coriacea, seniores deflexa, juniores patentia, recurvula, ovato-longe-attenuata, supra prope basim plana, superne concava, subtus convexa vel rotundata, succus brunneus; ad margines linea tenui albida cartilaginea cincta, dentibus parvis uncinatis armata. *Inflorescentia* paniculata, infra medium ramosa. *Pedunculus* distincte flexuosus. *Rami*. ca. 8, inferiores sub-ramosi. *Racemi* cylindrico-acuminati, sub-laxi, erecti. *Bractee* acuminato-acutae, 3-nervatae, scariosae. *Pedicelli* erecto-patentes, plus quam triplo longiores. *Perianthium* brunneo-rubrum, cylindricum, rectum, medium versus paulo constrictum: segmenta supra medium connata, interiores ad margines libera, dorsifixa, 3-nervata. *Filamenta* inclusa. *Antherae* breviter exsertae. *Stylus* exsertus. *Ovarium* rubro-flavum.

*Habitat*.—Tanganyika Territory: West Usambara Mts., Soni Dist., Kongai. No. 897 in Herb. Christian (type).

This is another of the Aloe spp. from Tanganyika sent me by Col. Boscawen in 1937. Although this Aloe has no close affinity amongst the published Aloe species, in the peculiar habit of its inflorescence it bears some resemblance to *A. acutissima* H. Perrier (see fig. in his monograph on "Lomatophyllum et les Aloe de Madagascar") but an examination of the leaves and floral characters would show that there is no actual relationship between them. Hitherto none of the Aloe spp. native to Madagascar have been recorded from the African continent.

The habit of the inflorescence also somewhat resembles that of *A. brachystachys* Bak. as figured in Bot. Mag. (1895) t. 7399, but this sp.

has an unbranched bare stem with a crown of leaves at the top, from the centre of which the unbranched inflorescence arises, and the bracts and flowers are entirely different. There remains *A. concinna* Bak., figured in Bot. Mag. t. 8790, the only other sp. known to me with a flexuose inflorescence, but differing in all respects even more than the two spp. cited above.

The most outstanding features of our new sp. are the characters of the leaves and habit of the inflorescence. The leaves are thin for their size, leathery and pliable and above the base deflexed, causing several deep transverse folds on the lower face. The inflorescence arises from below the crown, spreading horizontally, then becoming decurved as described. A third characteristic of this sp. is that the whitish, papery floral bracts in the initial stages of the inflorescence, before the buds develop, are erect-spreading to spreading and very conspicuous, giving the impression of an inflorescence in which the flowers have been stung and will not develop.

The photo, Pl. II, is of a plant which flowered in the garden at Ewanrigg in May, 1940.

This Aloe has a long flowering period, from May into August.

*Description.*—A succulent bushy plant up to 80 cm., or more, high, branching from low down. *Stems* foliate, ca. 6 cm. diam. *Leaves*, the younger spreading, recurved, the older spreading, or obliquely spreading for ca. 15 cm. above the base, then becoming deflexed, glaucous grey with a bluish tinge, immaculate, leathery and pliable, ovate-long-attenuate, up to 60 cm. or more, long, 9 cm. broad and 6 mm. thick, upper surface flat above the base, concave to channelled above, lower surface convex with several transverse grooves where the leaves become deflexed, sap brown; margins with a narrow acute whitish cartilaginous border armed with small brown-tipped deltoid uncinatate teeth, 2 mm. long and 17—20 mm. apart, interspaces straight. *Inflorescence* a panicle, branched from below the middle, spreading from the base, then becoming decurved, with the branches and racemes erect, up to 55 cm. high, total length of inflorescence 82 cm. *Peduncle* distinctly flexuose, very rarely straight, greenish-brown, laterally compressed, 15 mm. wide and 8 mm. thick, with two narrow whitish cartilaginous ribs armed with several minute teeth. *Bract* subtending lowest branch deltoid, 11 mm. long and broad, scarious, 3-nerved. *Branches* ca. 8, the lower sub-branched, arcuate-spreading to arcuate-erect, the lower 8 mm. diam., 40 cm. long, naked. *Racemes* sub-lax, cylindric-acuminate, the terminal up to 35 cm. long, buds erect, flowers spreading, becoming pendulous as they mature. *Floral bracts* acuminate-acute, 6 mm. long, 3 mm. broad, 3-nerved, scarious. *Pedicels* 20 mm. long, erect-spreading. *Perianth* brownish-

red, cylindric, straight, 30 mm. long, 11 mm. diam., slightly constricted towards the middle, then again widened, the base sub-rounded, not stipitate; outer segments free for 10 mm., 3-nerved, apices spreading, sub-acute, inner segments free on margins, dorsifixed to tube, dull yellow shading to brown at apices, sub-obtuse, slightly spreading. *Filaments* as long as perianth, yellow above, pink below. *Anthers* brown, just exerted, 3 mm. long, at length withdrawn. *Style* reddish-yellow, shortly exerted. *Ovary* reddish-brown, 6 mm. long, 3 mm. diam.

**Aloe kilifiensis** Christian sp. nov. in Sect. *Saponariaeae*. Affinis est *A. lateritia* Engl. sed planta minora est, foliis maculis sparsis profusius picta inflorescentia breviora et colore florum differt.

Planta succulenta, acaulis. *Folia* rosulata, patentia, recurvula, ovato-acuminata, acuta, supra viridia, tempore arido aerevertentia, maculis ovalibus et H-forma oblongatis albis sparsis profuse picta, imo concava, superne canaliculata, subtus maculis majoribus confluentibus profusius picta, convexa, superne rotundata; ad margines linea brunnea cornea cincta, sinuato-dentata, dentibus brunneis corneis deltoideis pungentibus irregulariter dispositis armata. *Inflorescentia* paniculata, supra medium ramosa. *Pedunculus* fusco-brunneus, nudus, unilaterally compressus. *Rami* graciles, arcuato-erecti. *Racemi* capitati, subdenses, flores maturi pendentes. *Bractee* triangulares, scariosae, 5-nervatae. *Pedicelli* inferiores arcuato-erecti, superiores erecto-patentes. *Perianthium* fusco-rubrum, supra ovarium constrictum, hinc ampliatum, faucem versus contractum, vix decurvulum, segmenta supra medium connata. *Filamenta* perianthium aequantia. *Antherae* exertae. *Stylus* pallide flavus, inclusus. *Ovarium* pallide viride.

*Habitat*.—Kenya Colony, Kilifi, near Mombassa on coral rag cliffs facing the sea, alt. 10—20 ft. B. D. Burt 5554 in Herb. Christian (type); in Herb. Kew and in Herb. Br. Mus.

This is one of the Aloes sent me by the late B. D. Burt in 1937. It was collected by Mr. J. V. Moggridge. It is readily distinguished from *A. lateritia* Engl. by its more profusely spotted leaves with smaller scattered spots, confluent on lower surface, by the habit of leaves turning copper coloured in dry season, by the spreading recurved habit of the leaves, by the shape of the flowers which are straight and contracted at the mouth and by the unusual deep wine-red colour of the flowers. It does not sucker and all the plants I have seen are remarkably uniform in habit and character. The photo, Plate III, is of a plant in flower at Ewanrigg in June, 1940. It usually flowers in February and again in June.

*Description*.—A succulent plant, acaulescent. Leaves ca. 15, rosulate,

spreading-recurved, from the base long-acuminate or ovate-acuminate, acute, 27 cm. long, 7 cm. broad at the base. The upper surface green-turning copper coloured in dry season, profusely spotted with scattered oval or H-shaped whitish spots, broadly concave near the base, channelled above, the lower surface more profusely spotted with larger confluent spots, convex towards the base, rounded above; the margins bounded by a brown horny border, sinuate-dentate, with brown horny deltoid teeth irregularly disposed, 3 mm. long, 4 mm. apart low down, more distant above.

*Inflorescence* a panicle up to 57 cm. high, erect, branched above the middle. *Peduncle* chocolate coloured, naked, 8 mm. diameter in the middle, flattened on one side low down, sub-terete above. *Bract* subtending lower branch long-triangular, 20 mm. long, 8 mm. broad, scarious 7-nerved. *Branches* ca. 4—6, arcuate, with one long triangular sterile bract 9 mm. long, 4 mm. broad, 5-nerved. *Racemes* capitate, terminal sub-dense, ca. 20-flowered, 8 cm. long, 8 cm. diameter, the buds spreading, the mature flower pendulous. *Floral bracts* long-triangular, 14 mm. long, 6 mm. broad, scarious, 5-nerved. *Pedicels* the lower arcuate-erect, 16 mm. long, the upper erect-spreading. *Perianth* deep wine-red, 30 mm. long, 10 mm. diam. over the ovary, constricted above the ovary to 6 mm. and widened again to 9 mm. contracted towards the mouth, laterally compressed to 7 mm.; outer segments free for 11 mm. with a narrow pinkish margin, obscurely 8-nerved, the apices straight, sub-acute, inner segments with broad whitish margins, free for 11 mm. dorsifixed to tube, apices straight, more obtuse. *Filaments* pale yellow, as long as the perianth. *Anthers* brown, exserted. *Style* pale yellow, included. *Ovary* pale green, cylindric-acuminate, 8 mm. long, 3 mm. diameter.

***Aloe ngongensis* Christian sp. nov. in Sect. *Prolongatae* Berg.**

Habitus affinis est *A. Pole-Evansii* Christian, sed planta minor aet, foliis griseo-viridibus, dentibus marginalibus brevioribus crebrioribusque, inflorescentia breviora, racemis capitatis et colore florum differt.

Planta fruticosa, e basi dense sobolifera, caules foliati. *Folia* griseo-viridia, immaculata, obscure striata ovato-attenuata, supra, basim versus plana, superne canaliculata, subtus convexa, succus atro-brunneus; ad margines dentibus deltoideis parvis armata.

*Inflorescentia* paniculata. *Pedunculus* infra medium ramosus. *Rami* ca. 7, graciles, terminalis bracteatus. *Racemi* capitati, densi. *Bractee* longe triangulares. *Pedicelli* erecto-patentes. *Perianthium* aurantiacorum, cylindricum, rectum, medium versus leviter constrictum; segmenta exteriora supra medium connata, segmenta interiora libera.

*Stamina* inclusa. *Stylus* interdum breviter exsertus. *Ovarium* pallide viride.

*Habitat*.—Ngong, Kenya. PE—JE 1129 in the gardens of the Div. Bot. Pretoria and in Herb. Christian (type).

This Aloe was collected by Mr. J. Erens on the Pole-Evans Central and E. Trop. Afr. Expedition in Sept., 1938, near Ngong, about 5 m. S. of Nairobi, growing in colonies in red loam soil on the edges of clumps of trees. It is easily distinguished from *A. Pole-Evansii* in being a smaller plant with grey-green leaves with dark brown sap and smaller marginal teeth. The inflorescence is shorter and branched from below the middle, the racemes capitate, rounded on top, the colour of the flowers is quite distinct and the inner segments of perianth free. It is not such a frequent bloomer as *A. Pole-Evansii* but usually flowers 3—4 times during the year.

The photo, Plate IV, is of a young plant which flowered for the first time in the garden at Ewanrigg on 14.4.41.

*Description*.—A low bushy plant up to 70 cm. high, suckering from the base. *Stems* erect, foliate, 2 cm. diam. *Leaves* grey-green immaculate, except in young plants, erect-spreading to ascending, ovate long-attenuate, 44 cm. long 7 cm. broad, upper surface flat low down, concave above and channelled towards the apex, striate, lower surface convex low down, rounded towards apex, obscurely striate, sap dark brown; margins acute, with a very narrow pale green cartilaginous border armed with rather small deltoid brown-tipped proclivent teeth, 2—2.5 mm. long, 9—11 mm. apart in the middle, more crowded towards the base, more remote above, interspaces curved low down, straight above. *Inflorescence* a panicle, 57 cm. high, branched from below the middle. *Peduncle* dull green, laterally compressed, 10 mm. broad, 7 mm. thick above the base, with a thin prominent rib down each side. *Bract* subtending lowest branch deltoid acute 8 mm. long, 8 mm. broad, 3-nerved, scarious. *Branches* ca. 7, slender, the lowest 4 mm. diameter, 27 cm. long, arcuate-erect, the terminal bracteate. *Sterile bracts* subulate, 8 mm. long, 5 mm. broad at base. *Racemes* capitate, rounded on top, dense, 8.5 cm. diam., 7 cm. long, buds red, green-tipped, erect, the mature flowers orange-red, pendulous. *Floral bracts* long-triangular, 7 mm. long, 4 mm. broad, 3-nerved, sub-scarious. *Pedicels* pale brown, 18 mm. long, erect-spreading, those of mature flowers pendulous. *Perianth* glossy, orange-red shading to yellow at apex, cylindric, straight, the base sub-rounded, 34 mm. long, 8 mm. diam. over the ovary, gradually constricted to 6 mm. diam. towards the middle, on lower side only, and again widened to 7 mm. diam. and contracted towards the throat; outer segments free for 10 mm., orange-red shading to pale yellow at margins

and apex, with 3 brown nerves running through to the base, apices sub-acute, spreading, inner segments free, white below, yellow above, with a narrow red keel or, sometimes, a narrow 3-nerved red median line, apices sub-obtuse, slightly spreading. *Filaments* white, included. *Anthers* brown, 2 mm. long, just exerted. *Style* yellowish-white, as long as perianth or just exerted. *Ovary* pale emerald green, cylindrical acuminate, 8 mm. long, 3 mm. diam.

**Aloe mubendiensis** Christian sp. nov. in Sect. *Prolongatae* Berg. Ab *A. ngongensis* Christian caulibus brevioribus, foliis maculatis, dentibus marginalibus majoribus remotioribusque, et characteribus aliis recedit.

Planta succulenta, breviter caulescens, dense sobolifera. *Caules* foliata. *Folia* longe acuminata, ascendunt, apicem versus recurvula, undique viridia, sparse maculata, ad margines linea cartilaginea cincta, dentibus procliventibus armata. *Inflorescentia* paniculata, circa medium ramosa. *Rami* ca. 13, inferiores sub-ramosa. *Racemi* sub-laxi, breviter cylindrici. *Bracteae* minutae, ovato-acutae. *Pedicelli* erecto-patentes. *Perianthium* rubrum, cylindricum, medium versus leviter constrictum, faucem versus contractum, vix decurvatum; segmenta exteriora per 9 mm. libera, segmenta interiora libera. *Stamina* exserta. *Stylus* demum exsertus.

*Habitat.*—Mubende, Uganda. P.E.—J.E. 1685 in Nat. Herb. Pretoria and in Herb. Christian (type).

This is another of the Aloes collected by Mr. J. Erens on the Pole-Evans Central and E. Trop. Afr. Expedition on 12.8.1938, 35 m. S.W. of Mubendi on the road to Fort Portal, alt. 4,000 ft. Mr. Erens writes that it was growing in leaf mould on granite outcrops in the open; that it occurs in considerable numbers and that no other Aloe sp. was seen near it.

It differs from *A. ngongensis* in being a much smaller plant, suckering more profusely, forming dense, low, clumps about 45 cm. high. The leaves are sparsely spotted, with larger more remote marginal teeth and the sap is at first colourless, eventually drying brown. The inflorescence is *pro rata* taller, the racemes laxer and less capitate, the bracts smaller and pedicels shorter.

It only flowers once during the year as against the 3—4 times of *A. ngongensis*.

The photograph, Pl. V, is of a plant in flower at Ewanrigg on 29.4.41.

*Description.*—Shortly caulescent, profusely suckering from ground level, forming dense low clumps. *Stems* foliate up to 40 cm. high and 1·7

cm. diam. *Leaves* erect-spreading, slightly recurved towards the apex, long-acuminate from the base or, sometimes, narrowly ovate-lanceolate, 36 cm. long, 6.5 cm. broad, green, sparsely spotted with scattered lenticular whitish spots, upper surface flatly concave above the base, channelled above, striate, lower surface paler green, convex low down, rounded above; margins with a pinkish cartilaginous border armed with reddish-brown-tipped deltoid teeth, either spreading or proclivent, 3—3.5 mm. long, 12 mm. apart low down, 16 mm. apart above, interspaces straight. *Inflorescence* erect, up to 95 cm. high, branched from about the middle. *Peduncle* brownish-green laterally compressed low down, sub-terete above, 20 mm. broad and 12 mm. thick above the base. *Branches* ca. 13, the lower sub-branched, slender, the lowest 5 mm. diam., 44 cm. long, erect-spreading, the upper more slender, 3 mm. diam., naked. *Racemes* sub-lax, shortly cylindric, 8 cm. long, 6 cm. diam., the lateral sometimes sub-secund, the buds slate-tipped, erect-spreading to erect, the mature flowers sub-pendulous. *Floral bracts* minute, ovate-acute, 3 mm. long, 2 mm. broad. *Pedicels* red, arcuate-erect to erect-spreading, 10—12 mm. long. *Perianth* dark brick-red, shading to yellowish at apex in the mature flowers, cylindric, nearly straight, the base flat, 30 mm. long, 8 mm. diam. over the ovary, very slightly constricted towards the middle on lower side, then widened again to 8 mm. and slightly contracted at throat, trigonous, outer segments free for 9 mm. brick-red shading to yellow at apex with 3 prominent nerves running through to the base, apices sub-acute, slightly spreading; inner segments free, white, shading to yellowish-brown at apices, with a narrow 3-nerved red median line, apices more obtuse, slightly spreading. *Filaments* exerted 4 mm., canary yellow. *Anthers* reddish brown, 2 mm. long, exerted. *Style* canary yellow, at length exerted. *Ovary* cylindric-acuminate, pale green, 4 mm. long, 2 mm. diam.

***Aloe turkanensis* Christian sp. nov.**

Breviter caulescens. *Caulis* demum decumbens, superne foliatus. *Folia* erecto-patentia, apicem versus recurvula, ovato-attenuata, viridia, ubique parce maculata; ad margines linea cartilaginea pallide viridia cincta, dentibus parvis deltoideis patentibus armata, interstitiis rectis. *Inflorescentia* sub-obliqua vel erecta, infra medium ramosa. *Pedunculus* brunneus, obscure profuse maculatus. *Rami* sub-obliqui. *Racemi* infra cylindrici, superne sub-secundiflori. *Bracteae* ovato-cuspidatae, 3-nervatae. *Pedicelli* patentes. *Perianthium* rubrum, rectum, sub-cylindricum, breviter stipitatum, segmenta exteriora supra medium connata, segmenta interiora libera. *Stamina* stylusque exserta.

*Habitat.*—Turkana Desert, Kenya, below the second escarpment, ca. 180 miles N.W. of Kapenguria. In gardens of Div. Bot. and P.P. Pretoria 1610 and in Herb. Christian (type).

The photo, Pl. VI, is of a plant which flowered for the first time in the garden at Ewanrigg on 7.5.41, and was collected by Mr. J. Erens on the Pole-Evans East Tropical African Expedition, on 2.8.1938. Mr. Erens reports that it occurs in fairly large numbers in the open and on edges of dry scrub in sandy soil, and that no other *Aloe* spp. were seen near it. It does not sucker freely. It has no close affinity, but the characters of its inflorescence point to its belonging to a group of *E. Trop. African* spp. characterised by sub-oblique branches and sub-secund flowers, of which *A. floramaculata* Christian and *A. Erensii* Christian are examples.

*Description.*—A shortly caulescent succulent plant ca. 45 cm. high. *Stems* foliate, at length becoming decumbent. *Leaves* 14—18, erect-spreading, slightly recurved towards apex, 40 cm. long, 6—7 cm. broad, and 1.5 cm. thick, narrowly ovate-long-attenuate, dull green, sparsely spotted on both faces with rather long pale green scattered lenticular spots, upper surface broadly concave, lower surface convex, sap yellow, margins with a narrow green cartilaginous border, armed with whitish deltoid spreading teeth, 2 mm. long, 12 mm. apart below, 18 mm. apart above, interspaces straight. *Inflorescence* erect or sub-oblique, up to 92 cm. high, branched from below the middle. *Peduncle* brown, profusely obscurely spotted with small greyish spots, laterally compressed low down, terete above, ribbed on both sides, with a few minute teeth along the ribs. *Bract* subtending lowest branch deltoid cuspidate, 10 mm. long, 8 mm. broad, 5-nerved, scarious. *Branches* ca. 8, the lower sub-branched, brown, obscurely spotted, slender, the lowest 4 mm. diam., 39 cm. long, obliquely spreading, naked or with one sterile bract. *Racemes* sub-cylindric below, sub-secund above, sub-dense, the terminal 26 cm. long, 6 cm. diam. the buds slate-tipped. *Bracts* ovate-cuspidate, 7 mm. long, 3 mm. broad, white, papery, with 3 brown nerves. *Pedicels* spreading, 8 mm. long. *Perianth* red, faintly minutely maculate, shading to brownish at apex, with the nerves running through to the base, shortly stipitate, 25 mm. long, 9 mm. diam. over ovary, gradually constricted to 7 mm. diam. and not again widened, laterally compressed, trigonous, straight; outer segments free for 10 mm., red shading to brownish at apex, with narrow pinkish margins, apices sub-acute, slightly spreading, inner segments free, white, with a 3-nerved red keel, apices sub-acute, slightly spreading. *Filaments* exerted, canary yellow above, white below. *Anthers* reddish brown, 2 mm. long, at length withdrawn. *Style* canary yellow, exerted. *Ovary* pale green, 6 mm. long, 3 mm. diam.



**Aloe Tweediae** Christian, sp. nov. affinis ad *A. floramaculata* Christian, sed foliis maculatis, bracteis pedicellis floribusque minoribus et forma florum differt.

Planta succulenta acaulis. *Folia* rosulata, erecto-patentia vel ascendentia, superne recurvula, ovato-acuminata, acuta, viridia, obscure maculata, ad margines linea tenuissima acuta cincta, dentibus deltoideis procliventibus armata. *Inflorescentia* erecta, infra medium ramosa. *Racemi* sub-obliqui, laterales sub-secundiflori, terminalis erectus cylindrico-acuminatus. *Bracteae* deltoideo-acutae, parvae. *Perianthium* rubrum, superne flavescens, nervae prominentes percursae, basi stipitatum, cylindricum, rectum, medium versus leviter constrictum. Segmenta exteriora infra medium connata segmenta interiora libera. *Stamina* exserta, demum retracta. *Stylus* exsertus. *Ovarium* flavo-viride.

*Habitat.*—West Suk, Kenya Colony, near Karamoja on Uganda border. No. 1080 in Herb. Christian (type).

I have much pleasure in naming this Aloe for Mrs. E. M. Tweedie who has, for some years, been collecting and painting the flora of the Mt. Elgon Dist., Kenya, for Kew. Mrs. Tweedie, who kindly sent me living material and seed, writes that this sp. occurs in considerable numbers on the flats in semi-desert country covered with thorn scrub, alt. 3,500—4,000 ft. Rainfall 15 ins, mostly in heavy showers. A few plants with unspotted leaves were seen. A specimen in flower was sent to Kew in Dec., 1934, but not identified. The photo, Pl. VII, is of a plant which flowered in the garden at Ewanrigg on 6.9.41 for the first time, and is not yet full grown, and was collected by Mrs. Tweedie in the type locality on 27.11.39. It is readily distinguished from *A. floramaculata* by its maculate leaves with very narrow, acute, cartilaginous borders armed with proclivent to uncinat teeth, by its shorter racemes, smaller bracts and pedicels and much smaller flowers with their lower segments upturned at the mouth. In all the plants raised from seed, the leaf characters are remarkably uniform, and the leaves are ascending not erect-spreading.

*Description.*—An acaulescent succulent plant, non-suckering. *Leaves* 14—16, rosulate, erect-spreading or ascending, recurved towards apex, ovate-acuminate, acute up to 45—60 cm. long, 14 cm. broad low down and 17 mm. thick, upper surface green, usually obscurely and sparsely spotted with paler green scattered elliptical spots, occasionally unspotted, broadly concave, lower surface more obscurely spotted, convex; margins with a very narrow acute yellowish white cartilaginous border furnished with brown tipped green deltoid proclivent teeth, thick at the base, 4 mm. long, 14—18 mm. apart, interspaces straight. *Inflorescence* 1—2 from the same rosette, erect, branched from below the middle with 14—20

obliquely spreading branches, the lower sub-branched, up to 1.45 m. high. *Peduncle* brown, pruinose, laterally compressed low down, subterete above. *Bracts* subtending lower branches very small, deltoid acute, 5 mm. long, 5-nerved, scarious. *Racemes*, the terminal subdense, cylindric-acuminate, 19 cm. long, 6 cm. diam., the lateral shorter than the terminal, sub-secund, the buds red, tipped with slate. *Floral bracts* deltoid-acute, appressed to pedicels, 4 mm. long, 2—3 nerved. *Perianth* red shading to yellowish above, with prominent nerves running through to the base, cylindric, straight, 25 mm. long, the base stipitate, 9 mm. diam. over the ovary, slightly constricted to 8 mm. diam. towards the middle and again widened to 9 mm., outer segments free for 15 mm. red with yellowish margins, the upper segments straight, the apices acute, slightly spreading, the lower segments curved upwards at mouth, not at all spreading at apices, inner segments free, yellowish white with a narrow keel shading to brownish at apex, the lower upcurved at mouth. *Filaments* exerted 4 mm., exerted portion pale yellow, white below. *Anthers* brown, 2 mm. long. *Style* pale yellow, exerted. *Ovary* yellowish green, 6 mm. long, 3 mm. diam.

**Aloe Jex-Blakeae** Christian sp. nov.

Planta succulenta, distinctissima, acaulis. *Folia* rosulata, carnosa, seniores patentia, juniores erecto-patentia usque erecta, ovato-lanceolata, acuminata; ad margines dentibus minutissimis armata. *Inflorescentia* erecta, superne ramosissima. *Racemi* breviter capitati, flores patentes. *Bracteae* minutae, triangulare-acutae, 3-nervatae. *Perianthium* citreum, clavato-cylindricum, rectum, faucem versus contractum, segmenta supra medium connata. *Stamina* exserta, demum retracta. *Stylus* tandem exsertus.

*Habitat.*—Kenya Colony, Horr Valley on the northern frontier to the E. of Lake Rudolph. Coryndon Mus. 7398 in Herb. Christian (type).

This very distinctive Aloe (Plate VIII) was collected in 1936 by the Lady Muriel Jex-Blake, in whose honour I have much pleasure in naming it. Lady Muriel writes that it occurs in semi-desert type of rocky country. It has no close ally amongst the published spp. of Aloe and does not fit well into any of the sections in Berger's Key in Das Pflanzenreich. Unfortunately my only plant was killed by that pest of Aloe gardens the Aloe weevil (*Brachycerus monarchus*) before coming into flower, and the description has been drawn up from photographs, sketches and notes by Lady Muriel, and Mr. P. R. O. Bally of the Coryndon Museum, Nairobi, and from dried material prepared by the latter.

This species is distinguished by its rather rigid fleshy leaves with very minute marginal denticulation, the teeth often obsolete in the upper

portion of the leaves, by the much branched and sub-branched inflorescence high up on the peduncle, by its flat capitate racemes in which the buds as well as the flowers are spreading, and by its small lemon-yellow flowers. It only occasionally throws out a sucker, and though it flowers regularly every year in Lady Muriel's garden, it has, hitherto, not set seed. The photographs, Pl. VIII, are of a plant in flower in Lady Muriel's garden, Kyuna, Nairobi, in May, 1940.

*Description.*—A succulent, acaulescent plant. *Leaves* rosulate, the older spreading, the younger erect-spreading to erect, ovate-lanceolate, acuminate, up to 68 cm. long and 13 cm. broad, green with a yellowish tinge, immaculate, fleshy, rather rigid, upper surface broadly concave low down, channelled above, bi-convex towards the margins, lower surface convex low down, rounded above, sometimes with a broad concave longitudinal depression in the middle of the lower portion of the leaf above the base, young leaves with a few narrow lenticular spots above the base on the upper surface, marginal teeth very minute, 0.5 mm. long or even shorter, often obsolete in upper portion of leaf, 5—8 mm. apart in the middle, closer below, more distant above, yellowish white, translucent, deltoid, spreading. *Inflorescence* paniculate, erect, 175 cm. high, much branched and sub-branched towards the apex of the peduncle. *Peduncle* erect, 1.25 cm. diam. below the branches. *Bract* subtending lowest branch deltoid, acute, 7 mm. long, 5 mm. broad, scarious, 3-nerved. *Branches* ca. 21, the lower with up to 6 sub-branches, obliquely spreading, the lowest up to 23 cm. long, the sub-branches slender, short, ca. 7.5 cm. long, usually with one sterile bract. *Racemes* dense, flatly capitate, ca. 1.3 cm. long and 5 cm. diam., the buds and flowers spreading. *Bracts* triangular-acute 3 mm. long, 1.5 mm. broad, membranous, 3-nerved. *Pedicels* 5 mm. long. *Perianth* lemon-yellow, straight, slightly clavate-cylindric, 20 mm. long, 5 mm. diam. over the ovary widening to 7 mm. above, contracted towards the mouth; outer segments free for 5—6 mm., lemon-yellow, with 3 brownish nerves running through to the base, apices straight, sub-acute, inner segments the same colour and length as the outer. *Stamens* exserted, at length withdrawn. *Style* at length exserted. *Ovary* 4 mm. long, 1.5 mm. diam.





FIG. 1.

PLATE I. *Aloe Boscareoti*, Christian.  
FIG. 1. Plant in Ewanrigg Garden, 2.2.39.  
FIG. 2. Flowers 1/1.



FIG. 2.

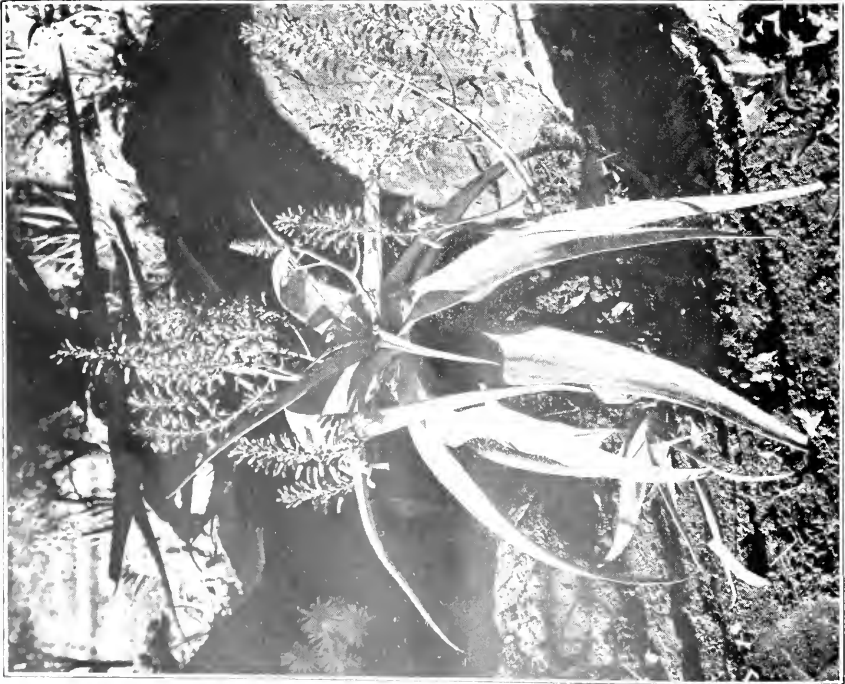


FIG. 1.

PLATE II. *Aloe flexilifolia*, Christian.  
FIG. 1. Plant in Exvanrigg Garden, May, 1940.  
FIG. 2. Flowers 1/1.

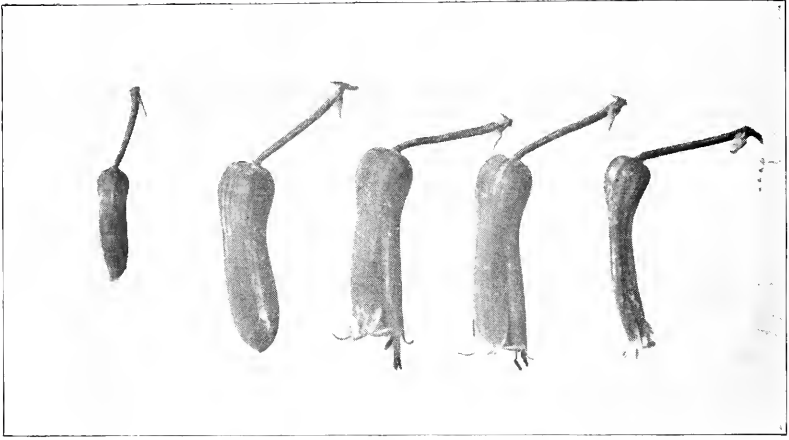


FIG. 2.

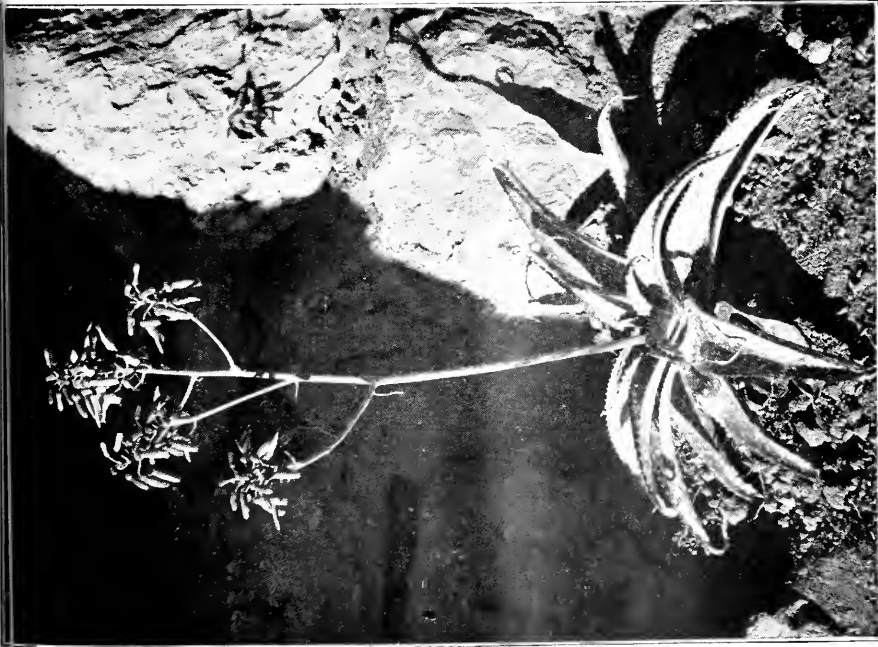


FIG. 1.

PLATE III. *Aloe kilifensis*, Christian.  
FIG. 1. Plant in Ewanrigg Garden, June, 1940.  
FIG. 2. Flowers 1/1.

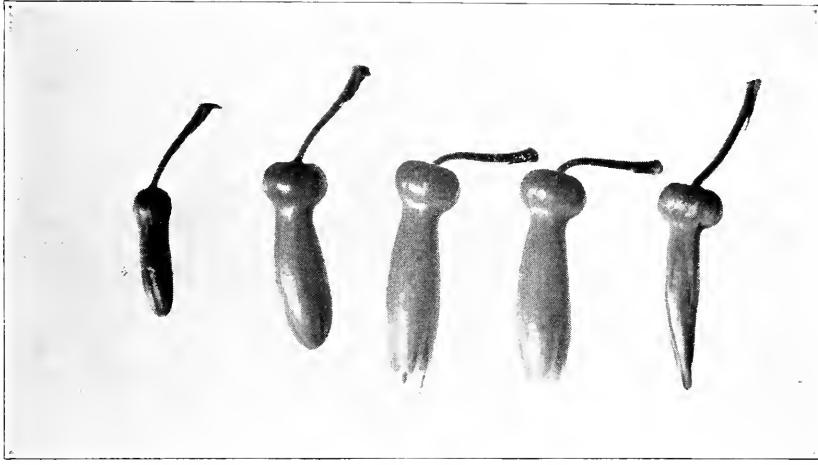


FIG. 2.

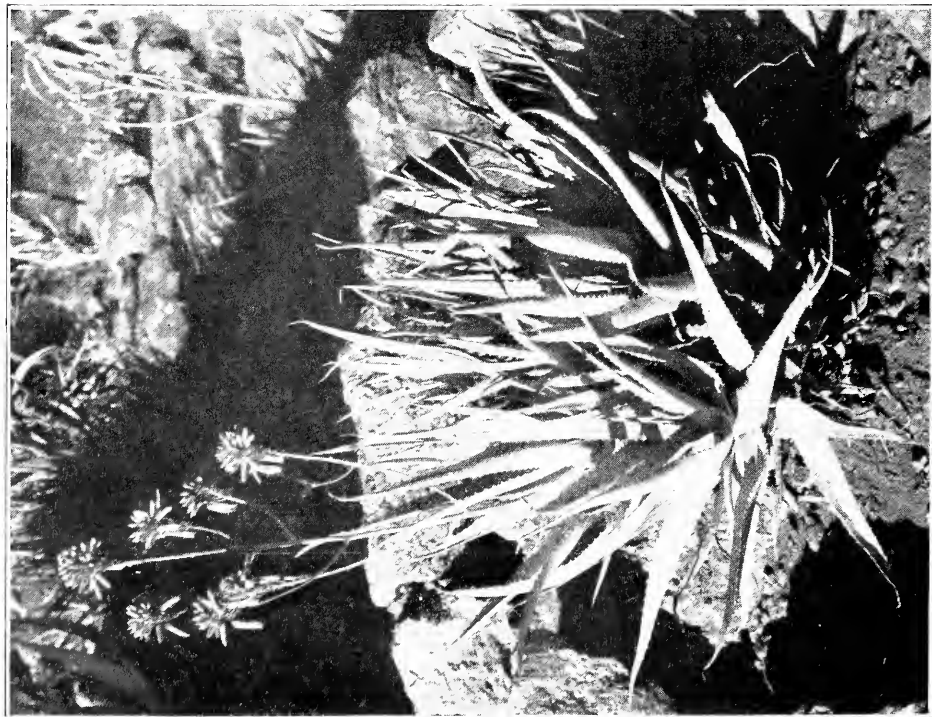


FIG. 1.

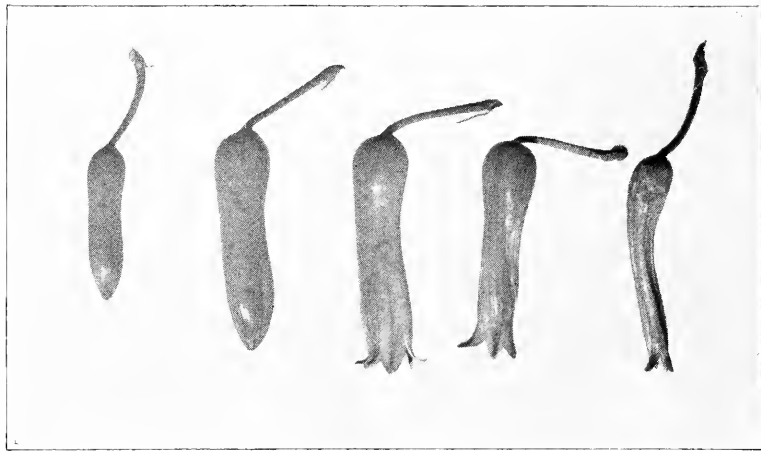


FIG. 2.

PLATE IV. *Aloe ngouensis*, Christian.  
FIG. 1. Plant in Ewarigg Garden, 14.4.41.  
FIG. 2. Flowers 1/1.





FIG. 1.

PLATE V. *Aloe rubendaniensis*, Christian  
FIG. 1. Plant in Ewaurigg Garden, 28.4.41.  
FIG. 2. Flowers 1/1.

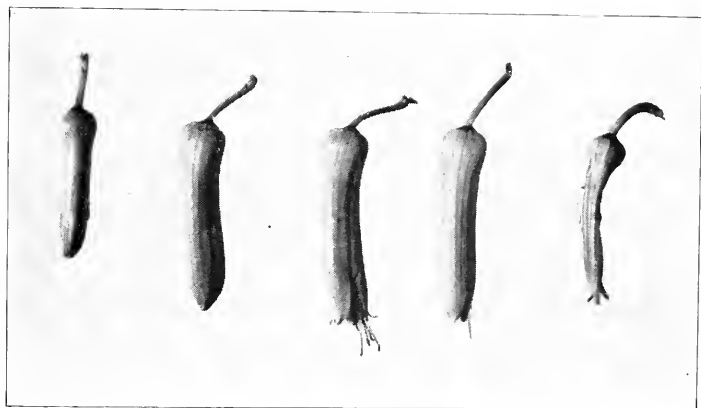


FIG. 2.

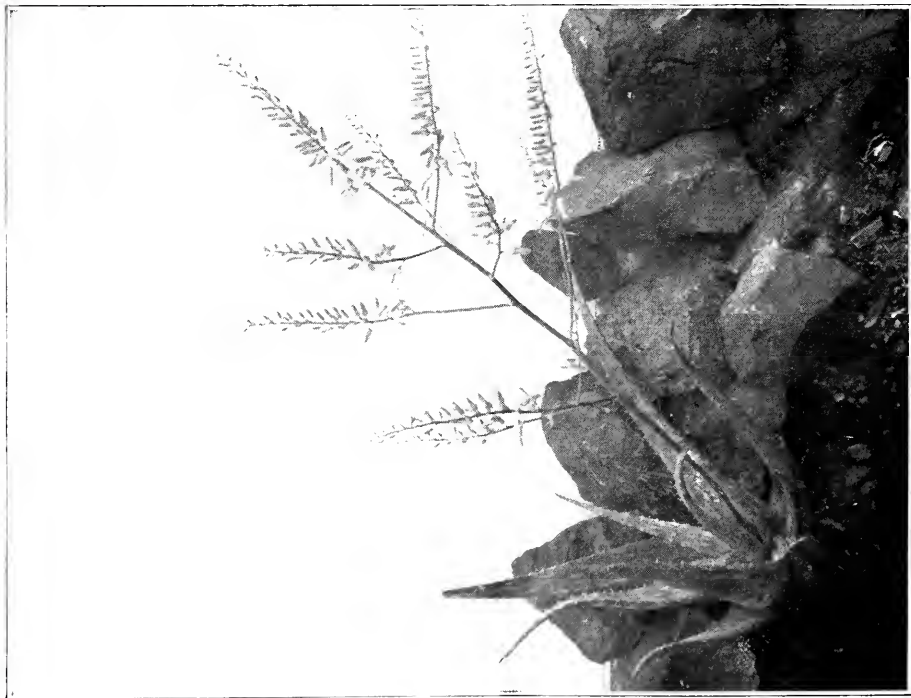


FIG. 1.

PLATE VI. *Aloe tukanensis*, Christian.  
FIG. 1. Plant in Ewanrigg Garden, 7.5.41.  
FIG. 2. Flowers 1/1.

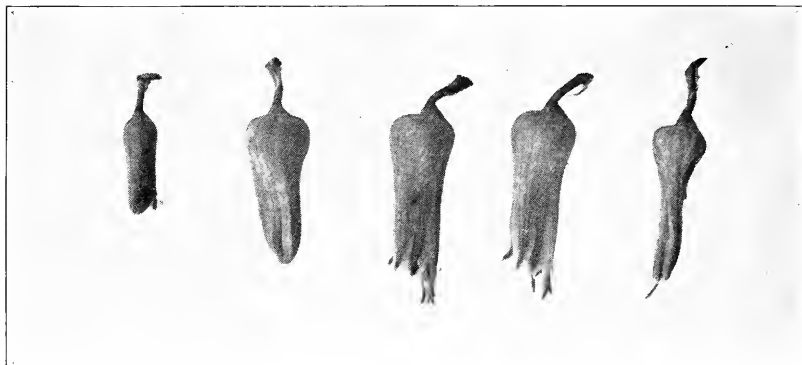


FIG. 2.



FIG. 1.

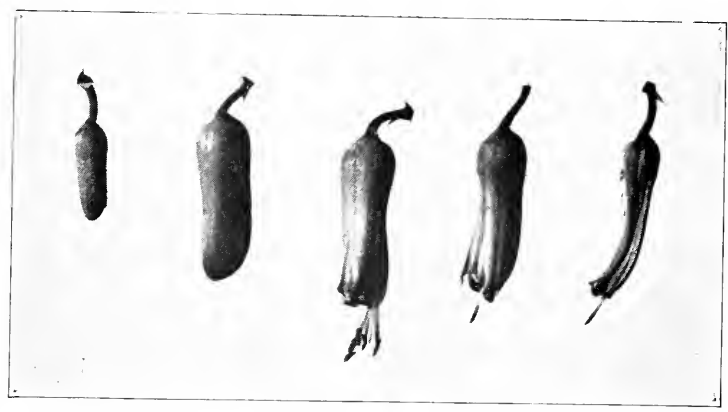


FIG. 2.

PLATE VII. *Aloe Tueddii*, Christian.  
FIG. 1. Plant in flower in Ewanrigg Garden, 6,941.  
FIG. 2. Flowers 1/1.



FIG. 1.

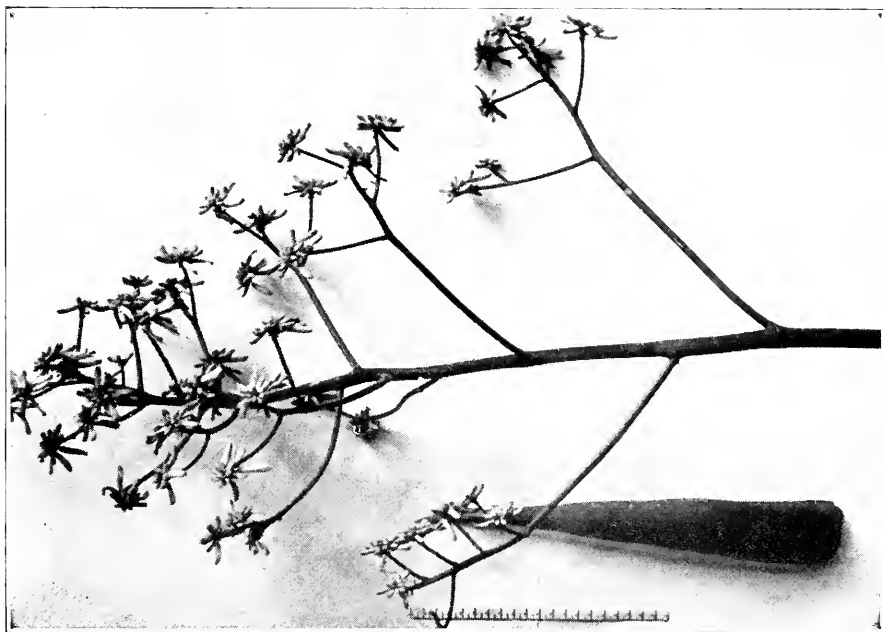


FIG. 2.

PLATE VIII. *Aloe Jex-Blakeae*, Christian.  
FIG. 1. Plant in flower in the Lady Mabel Jex-Blake's garden, Nairobi, 20.8.40.  
FIG. 2. Inflorescence.

## ON THE AUTUMNAL REMIGRATION OF NITROGEN AND PHOSPHORUS IN TRACHYPOGON PLUMOSUS.

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### INTRODUCTION.

In a previous study on the seasonal chemical changes in the roots of some South African Highveld grasses (27), the author drew the conclusion that in these grasses not only carbohydrates, but also nitrogen and phosphorus, are translocated in autumn from the shoots to the roots. This translocation of nitrogen and phosphorus presents an interesting plant-physiological problem, in so far as it is known that these elements occur in the plant body largely in the form of highly complex, insoluble compounds, such as proteins and others, which cannot be translocated in the plant body. Before the nitrogen and phosphorus can be translocated from cell to cell, the complex and insoluble compounds, of which these elements are constituents, must be broken down and converted into water-soluble degradation products, such as peptons, amino-acids, phosphates and others.

It was, therefore, considered likely that at certain stages during the period of autumnal remigration a change in the proportions of water-soluble and insoluble fractions of nitrogen and phosphorus occurred. This change might easily be followed by making estimations of both total and water-soluble nitrogen and phosphorus in the plants at suitable intervals during that time.

For this purpose, plants of *Trachypogon plumosus* were sampled from plots with and without fertiliser treatment during autumn and winter of 1939, and total and water-soluble nitrogen and phosphorus were determined in shoots and roots.

## MATERIALS AND METHODS.

## 1. LOCALITY OF SAMPLING.

The plots on which the plants were collected formed part of a fertiliser experiment which was laid out in 1937 by the writer at Frankenwald, the Botanical Research Station of the University of the Witwatersrand, near Johannesburg. This experiment, which has been described in full elsewhere (25), consisted of sixteen randomised plots, receiving four different fertiliser treatments (each in four replications).

The soil of the area is an acid, loamy sand, interspersed with much "oukclip" (iron sesquioxide), and poor in organic matter, nitrogen and phosphorus. The results of a soil analysis of the fine earth of this soil are given, as follows :—

*Percentages of Dry Fine Soil.*

|                   |    |      |                  |    |    |       |
|-------------------|----|------|------------------|----|----|-------|
| Loss on ignition  | .. | 3·8  | Nitrogen         | .. | .. | 0·102 |
| Maximum water re- |    |      | Phosphoric oxide | .. | .. | 0·019 |
| taining capacity  | .. | 32·8 | Potash           | .. | .. | 0·057 |

The vegetation in this area shows a marked response to fertiliser treatment, and as early as the first year those fertiliser treatments supplying nitrogen, phosphorus and potassium resulted in significant increases in the herbage yield and in the nitrogen and phosphorus content of the herbage (25).

For the present study merely two series of plots were selected as localities for sampling, namely, those plots receiving no fertiliser treatment at all (O-series), and those receiving a complete fertiliser treatment consisting of phosphate, muriate of potash and nitrate of soda (PNK-series). The quantities in which these fertilisers were applied were the same as those given during the previous season, and are given together with the times of application during the season 1938-39, as follows :—

400 lbs. per morgen of a mixture of equal quantities of super- and raw-rock-phosphate, distributed on 1st Dec., 1938 ; 80 lbs. per morgen of muriate of potash, distributed on 1st Dec., 1938 ; 790 lbs. of nitrate of soda, distributed in three equal quantities of 263·3 lbs. per morgen each on 14th Dec., 1938, 17th Jan., 1939 and 15th Feb., 1939.

## 2. METHOD OF SAMPLING AND PREPARATION OF THE SAMPLES.

On each of the eight plots constituting the two series (O and PNK) four tussocks of *Trachypogon plumosus* were dug out with their surface

roots (down to a depth of approximately six inches) on the following dates :—

- 1st March, 1939 (after flowering),
- 21st April, 1939 (seeding stage, most leaves still green),
- 5th June, 1939 (most aerial parts dead, few green leaves), and
- 29th July, 1939 (all aerial parts dead).

The sixteen tussocks collected on the same date from the four plots receiving the same fertiliser treatment were combined so as to form one sample and were immediately taken to the laboratory, where they were killed by autoclaving for five minutes at five lbs. pressure, in order to prevent chemical changes by enzymatic activity, and subsequently dried at a temperature of 60 to 70° C. Later, the shoots were separated from the roots, and the roots were washed free from adhering soil as far as possible, using a strong jet of water for not longer than half a minute, in order to avoid leaching of constituents from the tissue ; the roots were then dried again at the same temperature as before, after which both roots and shoots were finely ground and stored in air-tight bottles.

### 3. ANALYTICAL METHODS.

*Total Nitrogen.*—The ordinary Kjeldahl method could be used, since nitrates were found to be absent in the aqueous extracts of all samples. Potassium sulphate and selenized “ Hengar ” granules (as supplied by the Hengar Company, Philadelphia, U.S.A.) were used for the digestion.

*Total Phosphorus.*—2–3 g. samples of the ground material were saturated with 6% alcoholic calcium acetate solution, evaporated to dryness and incinerated. Silicon was removed from the ash by the usual procedure of dehydration, and phosphates were estimated in the filtered nitric acid extract as ammonium phosphomolybdate, using a semi-micro-method adapted by the Department of Agricultural Chemistry of the University of Pretoria from the official macro-volumetric method (1).\*

In brief outline, the procedure is as follows : 5-ml. aliquots of the nitric acid extract of the ash (100 ml.) are transferred to centrifuge tubes, 2 ml. of 50% ammonium nitrate solution are added, and phosphates are precipitated at 70° C. by adding 2 ml. of ammonium molybdate

\* Thanks are due to Mr. S. M. Murray, of African Explosives and Industries, and to Mr. L. M. Wentzel of the Department of Agricultural Chemistry of the University of Pretoria, for having communicated this method to the writer.

reagent, prepared as given by the A.O.A.C. (1). The tubes are left standing overnight and are then centrifuged; the super-natant liquid is siphoned off. The precipitate is washed and centrifuged three times, after which it is dissolved in 5 ml. N/10 NaOH and titrated with N/20 HCl; 1 ml. N NaOH used corresponds to 3.09 mg.  $P_2O_5$ ; duplicate estimations, as a rule, check within 0.1 ml. N/20 HCl titrated, which is equivalent to a maximum error of  $\pm 0.007\%$   $P_2O_5$  on a 2.5 g. sample.

*Preparation of Aqueous Extracts.*—After a certain amount of experimentation the following procedure was adopted: samples of the ground material (10 g. of the shoots and 5 g. of the roots) were shaken for four hours in flasks containing 100 ml. of distilled water and a few drops of toluene, using a mechanical shaking apparatus. The extracts were filtered through dry filters into dry flasks and aliquots† (whose volume depended on the volume recovered) were transferred to 100-ml. volumetric flasks. The extracts were subsequently heated to boiling in order to kill bacteria, allowed to cool down and, after addition of a few drops of toluene and chloroform, were made up to volume with distilled water. The extracts contained a certain amount of colloidal organic matter, but no attempt was made to remove this, since it was considered that such colloidal organic materials as could be extracted in this way from the plants could also be translocated in the plant body.

The difficulties connected with the extraction and estimation of nitrogenous fractions in plant tissues have been discussed by a number of workers. Alcohol is frequently used as extracting liquid, but Stuart (21) finds extraction with water at 25° C. more effective than with 80% alcohol. The use of water as extracting agent is also advocated by Davidson, Clark and Shive (4) who find boiling with water superior to a method of cold extraction in the preparation of peach extracts. Thomas (22), on the other hand, considers extraction with boiling water objectionable on account of the peptonization of proteins and other chemical changes which may be brought about by the boiling process. The use of fresh plant material—whenever possible—is recommended by most workers, since Chibnall (2) and Tottingham and associates (23) have demonstrated that the drying of plant tissues before extraction may result in changes affecting the proportional distribution of nitrogen among the various nitrogenous constituents. In the present study, the use of fresh plant material was not practicable on account of the great bulk of the samples, but since only total water-soluble nitrogen was estimated, it is not likely that any serious errors were introduced

† The amounts of water present in the original samples were very small (0.5—0.6 ml.) and hence were neglected in the calculation.



by the drying of the plant material, particularly as the plants were killed before being dried.

*Water-soluble Nitrogen.*—10-ml. aliquots of the above extracts were digested in the same way as the samples analysed for total nitrogen. The amounts of nitrogen in these 10-ml. samples were very small, ranging from 0.2 to 2.0 mg., but satisfactory results were obtained by using N/100 acid and alkali in the titration. Duplicate estimations in general, agreed within 0.05 mg. nitrogen for 10 ml. extract. If this was not the case, one or two more determinations were carried out, and the average value of all three or four determinations was accepted. Taking into account the preceding dilutions, the maximum error would amount to approximately  $\pm 0.006\%$  N.

*Water-soluble Phosphorus.*—25-ml. aliquots of the aqueous extracts, with addition of a small quantity of calcium acetate, were evaporated to dryness. The dry residue was ignited, and, after the removal of silicon, phosphates were estimated in the nitric acid extract of the ash by the method described above. Titration was effected with N/100 NaOH and N/200 HCl. Agreement between duplicate estimations was within 0.2 ml. N/200 HCl, corresponding to a maximum error of  $\pm 0.002\%$  P<sub>2</sub>O<sub>5</sub>.

According to Miller (14) considerable portions (60—80%) of the total phosphorous in plants may be present in water-soluble form. Henrici (11) found the water-soluble fraction of phosphorus in aerial and sub-aerial parts of various South African grasses varying between approximately 20 and 90% of the total phosphorus.

*Total Ash and Dry Matter.*—The percentage dry matter was determined by drying at 105° C. and total ash by ignition. By expressing all results of the chemical analysis—of shoots as well as of roots—as percentages of combustible dry matter, the error due to adhering sand (not removed by washing) was eliminated.

## DISCUSSION OF RESULTS.

The percentages of total nitrogen and of total phosphoric oxide in shoots and roots are given in Table I, and graphically represented in Figure 1. In both fertilised and unfertilised plants these constituents decreased very distinctly in the shoots during autumn and winter, at the same time increasing in the roots; this confirms the writer's previous results as well as those of many other workers (26, 27).

TABLE I.

## TOTAL NITROGEN AND TOTAL PHOSPHORUS CONTENT OF TRACHYPOGON PLUMOSUS.

Expressed as percentage of combustible dry matter.

| Date.         | TOTAL NITROGEN. |       | TOTAL PHOSPHORIC OXIDE. |       |
|---------------|-----------------|-------|-------------------------|-------|
|               | O               | PNK   | O                       | PNK   |
| SHOOTS.       |                 |       |                         |       |
| 1/3/39 .. ..  | 0·478           | 0·921 | 0·132                   | 0·216 |
| 21/4/39 .. .. | 0·448           | 0·642 | 0·103                   | 0·155 |
| 5/6/39 .. ..  | 0·344           | 0·573 | 0·066                   | 0·118 |
| 29/7/39 .. .. | 0·295           | 0·554 | 0·051                   | 0·112 |
| ROOTS.        |                 |       |                         |       |
| 1/3/39 .. ..  | 0·339           | 0·581 | 0·110                   | 0·192 |
| 21/4/39 .. .. | 0·525           | 0·897 | 0·176                   | 0·297 |
| 5/6/39 .. ..  | 0·658           | 0·993 | 0·211                   | 0·324 |
| 29/7/39 .. .. | 0·742           | 1·036 | 0·216                   | 0·310 |

In general, the first portions of the curves are steeper, while the changes at the end of the season are smallest; this seems to indicate that towards mid-winter a certain endpoint is approached. The slight decrease of total phosphorus in the roots of the fertilised plants between 5th June and 29th July may be due to a sampling error, or it may have been brought about by the simultaneous increase of other constituents (*e.g.* carbohydrates); on the other hand, actual losses of nitrogen and mineral elements from the roots during maturation have been demonstrated by various workers (10, 11, 26).

Fertiliser treatment, whilst not affecting the general trend of the seasonal changes, in all cases significantly increased the total nitrogen and phosphorus content of both shoots and roots. In fact, even in mid-winter (29th July) the nitrogen content of fertilised shoots was higher than that of unfertilised ones at the beginning of March; similarly, the phosphorus content of fertilised shoots in mid-winter exceeded the percentage of phosphorus in unfertilised shoots at the end of April. These findings confirm the results of Hall, Meredith and Murray (8) who stress the economic importance of the fact that by the use of fertilisers the nutritive value of pasture herbage can be kept at a relatively high level right through the season.

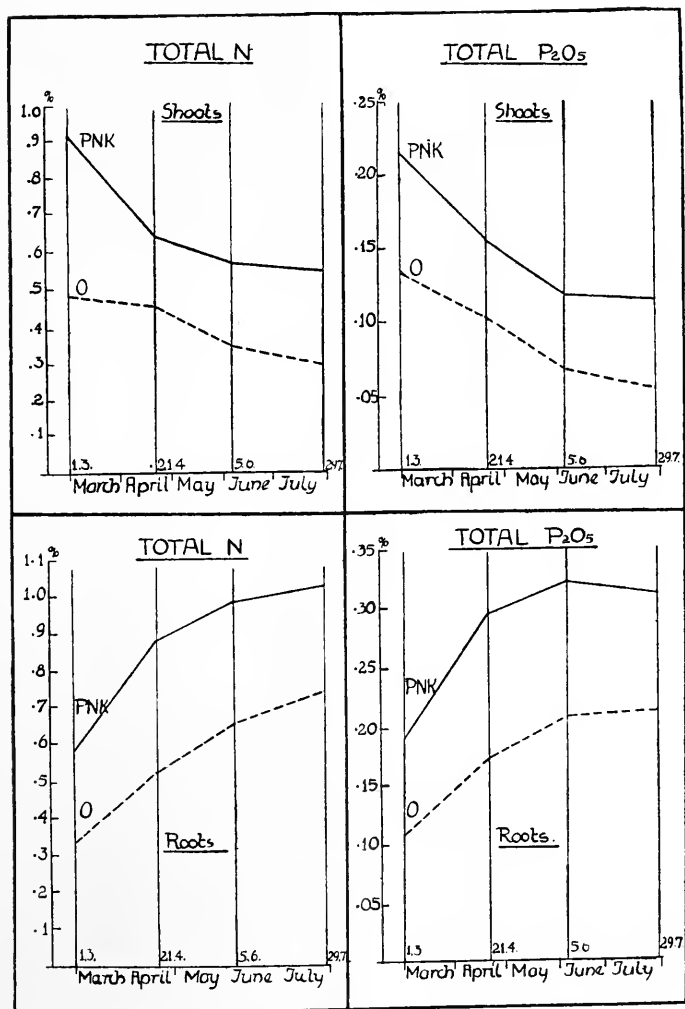


FIG. 1. Total nitrogen and total phosphorus content of *Trachypogon plumosus*. Expressed as percentage of combustible dry matter.

The increase in the percentages of nitrogen and phosphorus in the roots at a time when the elements decrease in the aerial parts, suggests that nitrogen and phosphorus are translocated during autumn

and early winter from the shoots to the roots. This has been confirmed by more accurate experiments with *Phalaris tuberosa* (20) and *Chloris gayana* (26), where the amounts of nitrogen, phosphorus and other constituents lost from the shoots were actually recovered in the roots. Henrici (10, 11), in extensive investigations on the phosphorus content of a number of species of South African grasses, also came to the conclusion that "remigration of phosphorus in autumn is beyond doubt", but considers that "neither the emptying of the aerial organs nor the storing of the remigrating phosphorus is quantitative" (11).

The percentages of the water-soluble fractions of nitrogen and phosphoric oxide (on the combustible dry matter basis) are given in Table II and in Figure 2. The general trend of these curves is the same as that of the curves for total nitrogen and total phosphorus: water-soluble nitrogen and phosphorus decreased in the shoots, and increased in the roots during maturation; likewise, the percentages of both water-soluble nitrogen and water-soluble phosphorus were increased in the roots as well as in the shoots by fertiliser treatment.

TABLE II.

WATER-SOLUBLE NITROGEN AND WATER-SOLUBLE PHOSPHORUS CONTENT OF TRACHYPOGON PLUMOSUS.

Expressed as percentage of combustible dry matter.

| Date.         | WATER-SOLUBLE NITROGEN. |       | WATER-SOLUBLE PHOSPHORIC OXIDE. |       |  |
|---------------|-------------------------|-------|---------------------------------|-------|--|
|               | O                       | PNK   | O                               | PNK   |  |
| SHOOTS.       |                         |       |                                 |       |  |
| 1/3/39 .. ..  | 0·080                   | 0·145 | 0·085                           | 0·157 |  |
| 21/4/39 .. .. | 0·066                   | 0·095 | 0·072                           | 0·120 |  |
| 5/6/39 .. ..  | 0·069                   | 0·106 | 0·059                           | 0·118 |  |
| 29/7/39 .. .. | 0·050                   | 0·070 | 0·035                           | 0·091 |  |
| ROOTS.        |                         |       |                                 |       |  |
| 1/3/39 .. ..  | 0·074                   | 0·211 | 0·065                           | 0·141 |  |
| 21/4/39 .. .. | 0·187                   | 0·526 | 0·140                           | 0·288 |  |
| 5/6/39 .. ..  | 0·311                   | 0·581 | 0·164                           | 0·282 |  |
| 29/7/39 .. .. | 0·444                   | 0·604 | 0·179                           | 0·259 |  |

However, in contrast to the fairly even decrease of the percentages of total nitrogen and phosphorus in the shoots during maturation, the curves representing the water-soluble fractions of these constituents

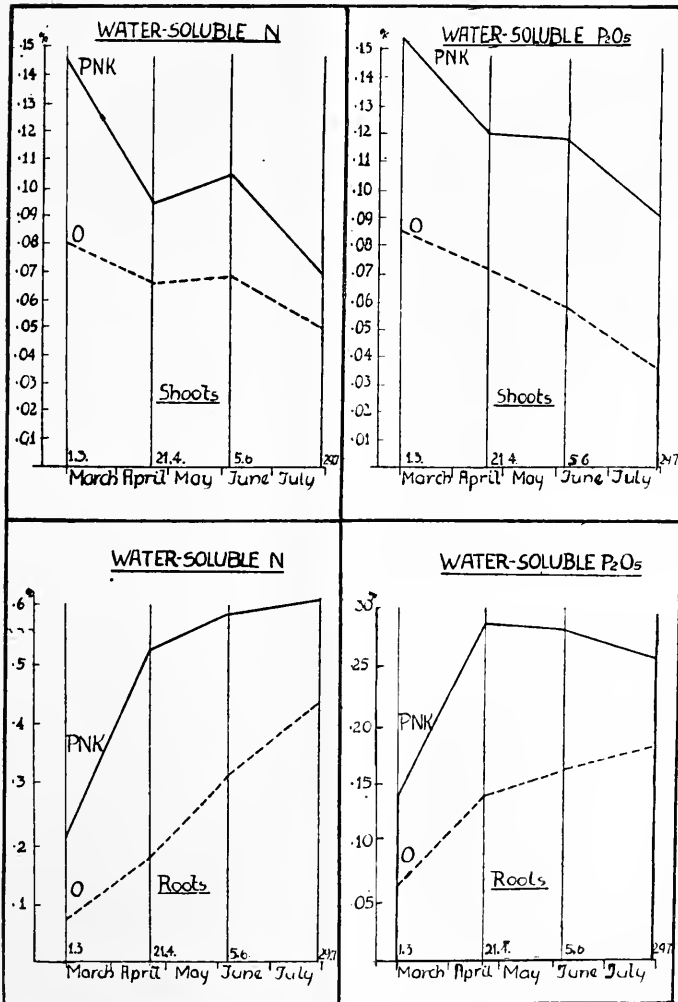


FIG. 2. Water-soluble nitrogen and water-soluble phosphorus content of *Trachypogon plumosus*. Expressed as percentage of combustible dry matter.

in the shoots are characterised by a "break" between the second and third sampling dates (21st April and 5th June). During this period, water-soluble nitrogen in the shoots did not decrease, but rose slightly

(namely from 0.066% to 0.069% and from 0.095% to 0.106% respectively). Water-soluble phosphorus remained almost constant in the shoots of the PNK-series during the same period, and only in the O-series it decreased more or less evenly right through the period of maturation.

In Table III and Figure 3, water-soluble nitrogen and phosphorus are expressed as percentages of total nitrogen and total phosphorus respectively. It can be seen from these curves that the above-mentioned "breaks" were associated with very substantial changes in the relative proportions of water-soluble and insoluble fractions of these elements in the shoots. Thus, during the period from 21st April to 5th June the water-soluble fractions of nitrogen in the shoots of the O- and PNK-series rose from 15% to 20.1 and 18.5% respectively. Water-soluble phosphorus, which made up about 2/3 of the total phosphorus of the shoots as early as the beginning of March, rose slightly during that month, and sharply between 21st April and 5th June: at the end of this period 90% (O-series) and even 100% (PNK-series) of the total phosphorus of the shoots was present in water-soluble form.

TABLE III.

WATER-SOLUBLE FRACTIONS OF NITROGEN AND PHOSPHORUS IN  
TRACHYPOGON PLUMOSUS.

Expressed as percentages of total nitrogen and total phosphorus respectively.

| Date.         | WATER-SOLUBLE NITROGEN. |       | WATER-SOLUBLE PHOSPHORUS. |       |
|---------------|-------------------------|-------|---------------------------|-------|
|               | O                       | PNK   | O                         | PNK   |
| SHOOTS.       |                         |       |                           |       |
| 1/3/39 .. ..  | 16.75                   | 15.75 | 64.5                      | 72.7  |
| 21/4/39 .. .. | 14.75                   | 14.82 | 70.0                      | 77.4  |
| 5/6/39 .. ..  | 20.10                   | 18.48 | 89.4                      | 100.0 |
| 29/7/39 .. .. | 16.95                   | 12.65 | 68.7                      | 81.4  |
| ROOTS.        |                         |       |                           |       |
| 1/3/39 .. ..  | 21.85                   | 36.60 | 59.2                      | 73.4  |
| 21/4/39 .. .. | 35.65                   | 58.60 | 79.5                      | 97.0  |
| 5/6/39 .. ..  | 47.25                   | 58.50 | 77.7                      | 87.0  |
| 29/7/39 .. .. | 59.85                   | 58.30 | 82.9                      | 83.5  |

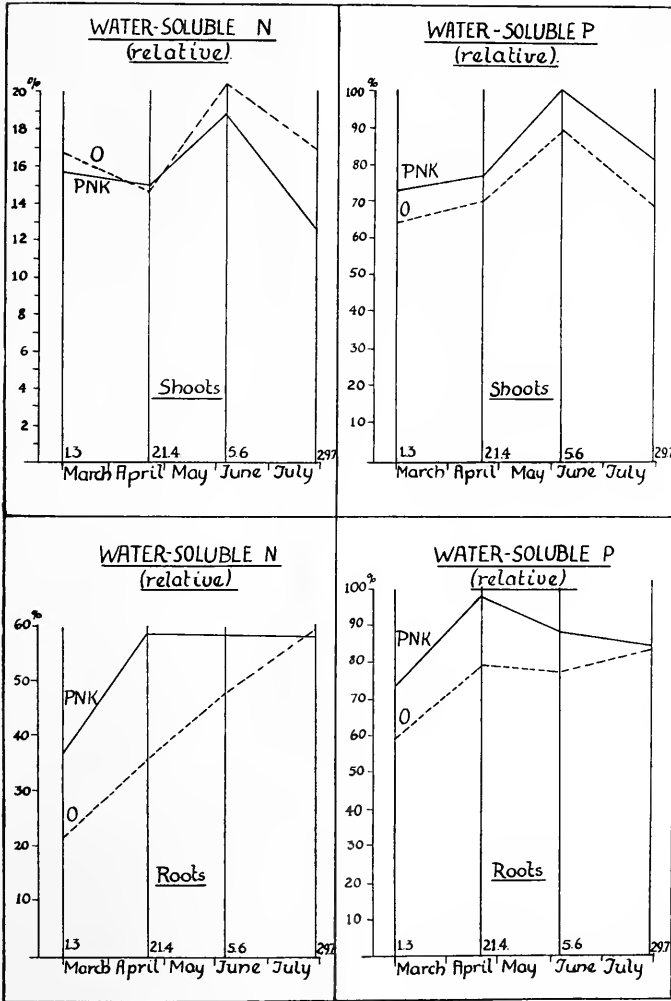


FIG. 3. Water-soluble fractions of nitrogen and phosphorus in *Trachypogon plumosus*. Expressed as percentages of total nitrogen and total phosphorus respectively.

The interpretation of these data is not difficult if the various physiological processes, which are connected with the translocation of these elements, are seen in their true relationships. The data available seem

to indicate that the view that nitrogen and phosphorus are translocated from shoots to roots during autumn is well founded. The actual process of translocation is, however, preceded by the hydrolysis of complex organic compounds, of which nitrogen and phosphorus are constituents, to water-soluble substances. Since it is the water-soluble fractions of nitrogen and phosphorus which are actually translocated from shoots to roots, it is evident that the percentages of water-soluble nitrogen and phosphorus in the shoots at any given stage during maturation are mainly determined by the rate of decomposition of the complex nitrogenous and phosphorus-containing substances, and by the rate of translocation of the resulting soluble decomposition products to the roots. When the rate of decomposition exceeds the rate of translocation the percentage of the water-soluble fractions will increase, and vice versa. The percentages will remain constant over periods during which the rate of decomposition and the rate of translocation are equal.

In the period extending from 21st April to 5th June insoluble nitrogen in the shoots of both series was converted to water-soluble nitrogen at a rate exceeding the rate of translocation of water-soluble nitrogen to the roots—hence the rise in water-soluble nitrogen during that period. In the shoots of the fertilised plants insoluble phosphorus was converted to water-soluble phosphorus almost as fast as it was removed to the roots; only in the O-series did the translocation rate of water-soluble phosphorus exceed the rate of hydrolysis. The fact, however, that even here the rate of decomposition of insoluble phosphorus compounds was relatively higher than the rate of removal of the resulting decomposition products, is proved by the change in the relative proportion of water-soluble and total phosphorus in the shoots, which shows a rise of the water-soluble fraction from 70.0% to 89.4% between 21st April and 5th June (Table III).

It should be remembered that the figures for total and water-soluble constituents, expressed as percentages of combustible dry matter (Tables I and II), do not represent actual amounts, but merely concentrations which will be affected by any change of the total dry matter. Such changes of the dry matter actually do take place at practically all times of the season: the dry matter of the shoots may still have increased slightly after flowering, whilst after seeding—or possibly even before—total dry matter most probably decreased slightly due to remigration of a number of substances. The effects of such variations may be small; in any case, they are completely eliminated if water-soluble nitrogen and phosphorus are expressed as percentages of total nitrogen and phosphorus respectively (Table III and Figure 3). These relative per-



centages increased most significantly in the shoots of both series during the period from 21st April to 5th June.

During this period, also, most of the aerial parts died off, only a few leaves remaining green by 5th June. The discolouration and dying off of the aerial parts of herbaceous plants is, of course, characteristic of this time of the year: the month of May is generally regarded as the first winter month in this area. This is also borne out by Figure 4, which represents the curve of daily minimum temperatures, as measured at Frankenwald during the second half of the season 1938-39. Between the 21st April and 5th June there was a noticeable drop in the tempera-

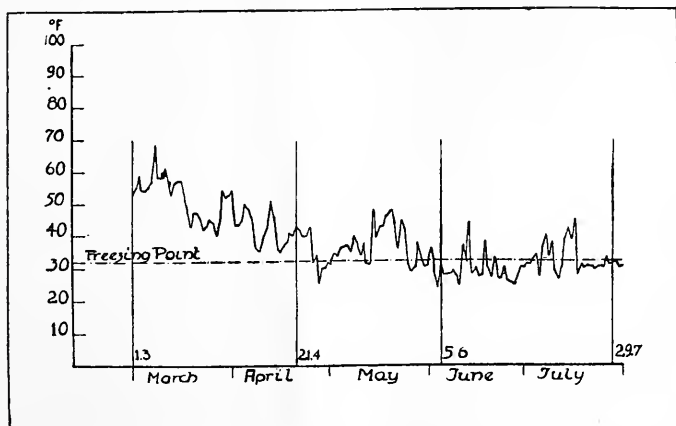


FIG. 4. Curve of daily minimum temperatures, recorded at Frankenwald Research Station from 1st March to 1st August, 1939.

ture; minimum temperatures during that period in general approached the freezing point. Actual frosts set in soon after the second sampling date, namely, on 26th April, and before 5th June altogether fifteen frost days were recorded.

Hence the conclusion must be drawn that, during the period of low autumnal temperatures, breakdown processes took place at a maximum rate, resulting in the accumulation of water-soluble decomposition products in the aerial parts. This process was simultaneous with the yellowing and dying-off of the larger part of the leaves.

This conclusion is also supported by abundant evidence put forward by previous workers. Michael (13), working with *Tropaeolum*, concluded that yellowing is connected with the removal of protein breakdown products, and found that protein and chlorophyll breakdown

follow, in general, parallel courses. Mothes (15) considered that protein synthesis is more active in young leaves than in old, and that in mature leaves protein hydrolysis plays the major rôle. That low temperatures result in the breakdown of proteins in plants has been proved by number of workers. Thus Harvey (9) found that exposure of cabbage plants to low temperatures resulted in an increased amino-acid content. Similar results were obtained with wheat by Dexter (5) and Newton (17); the latter also found that the ratio of amino nitrogen to total nitrogen increased in autumn in all wheat varieties used in his experiments. Wilhelm (28) found that in bean plants which had been exposed to cold soluble nitrogen as a percentage of total nitrogen increased at the expense of protein nitrogen, and concluded that at low temperatures proteins are broken down with the accumulation of simpler nitrogenous compounds, particularly amino-acids. Newton, Brown and Anderson (18) exposed expressed sap of winter wheat plants to frost, and found that this treatment decreased coagulable proteins and increased amino-acids.

Similarly, changes in plants of insoluble carbohydrates, particularly starch, to sugars due to low autumn temperatures have been reported by various workers: amongst others by Traub in apple twigs (24), by Graber and associates in lucerne (6), and by McCarty in *Bromus carinatus* (12). Müller-Thurgau (16) concluded that diastatic action was stimulated at the freezing point. Since, however, modern enzyme chemistry (7) has shown that lowering of temperature within wide limits decreases enzymatic activity, it appears very unlikely that the observed changes are due to direct activation of enzymes. Coville (3) thinks that the change is brought about by the weakening of the cell membranes, which become permeable to amylolytic enzymes, and that these then act upon the starch grains stored in the cells. In a recent contribution, H. T. Northen (19) suggested that stimulation results in a change of the grid structure of the protoplasm of the cell. Such changes are connected with a decrease in the structural viscosity of the protoplasm, which can be measured in some plant materials by certain methods. Northen was able to show that temporary exposure of *Spirogyra* cells to cold actually resulted in a measurable decrease of the viscosity of their protoplasm. The increase in respiration rate, which, in general, is brought about by most stimulating agents, is explained by Northen as being due to the release of substrates and respiratory enzymes, following the loosening or breaking down of the protoplasmic network of the cell.

*The suggestion may be put forward here that, by an analogous process, as a result of low autumn temperatures, hydrolases and substrates are liberated from a more fixed position within the protoplasmic structure, leading to the observed acceleration of decomposition processes.*

The fate of the water-soluble nitrogen and phosphorus compounds translocated to the roots still remains to be discussed. As Table II shows, water-soluble nitrogen and phosphorus increased in the roots of both series with the advancing season; in the PNK-series water-soluble phosphorus reached its maximum concentration as early as 21st April, while total phosphorus increased until 5th June. The water-soluble fraction of nitrogen increased up to almost 60% of the total nitrogen in the roots, but, whereas this level was not reached in the O-series before the end of July, it was reached in the PNK-series by 21st April, after which date it remained constant. Hence it would appear that a certain equilibrium between water-soluble and insoluble nitrogen was approached in the roots, and was reached when about 60% of the total nitrogen was present in water-soluble form. The case of water-soluble phosphorus is similar, at least in the O-series, where the water-soluble fraction of phosphorus also remained more or less constant, after having reached the value of about 80% of the total phosphorus.

In the PNK-series the water-soluble fraction of phosphorus rose to a higher relative percentage, namely, 97%, by 21st April; after this date a certain decrease took place, so that finally the proportions of water-soluble phosphorus to total phosphorus were the same in both series (82.9 and 83.5% respectively). Since the decrease in water-soluble phosphorus in the roots between 21st April and 29th July was bigger than that in total phosphorus during the same period, it can only be concluded that some of the water-soluble phosphorus compounds translocated to the roots were resynthesised to insoluble phosphorus compounds, though some actual losses of phosphorus from the roots into the soil may have taken place at the same time.

The fact that about 60 per cent. of the stored nitrogen, and over 80% of the phosphorus, remained in water-soluble form in the roots, should be of no small physiological significance. It should be added that most of the storage carbohydrates are also present in water-soluble form in the roots of this grass. In previous investigations (27) it was found that total sugars increased up to 5% or more in the roots of *Trachypogon plumosus* during autumn and winter, whilst starch, in general, did not exceed 1% of the organic dry matter. It may be assumed that such a large proportion of soluble organic materials in the roots, in conjunction with inorganic solutes present, results in a relatively high osmotic pressure.

Increased osmotic pressure would account for the ability of the roots to endure the dry and cold winter months. Unfortunately, no data for the osmotic pressure of the roots of this or other South African High-

veld grasses are available as yet. Further, the presence of comparatively large proportions of soluble organic reserves may enable the plant to resume growth quickly with increasing temperatures: it is well known that *Trachypogon plumosus* is one of the first grasses to shoot in spring, forming new leaves, in general, at the end of August—long before the spring rains.

#### SUMMARY.

Plants of *Trachypogon plumosus* were collected from fertilised and unfertilised plots during autumn and winter 1939, and total nitrogen and phosphorus, as well as the water-soluble fractions of these constituents, were determined in shoots and roots.

The percentages of total and water-soluble nitrogen and phosphorus decreased in the shoots, and increased in the roots, during autumn and winter.

The conclusion is drawn that in autumn nitrogen and phosphorus are translocated from shoots to roots in the form of water-soluble compounds, largely formed by the degradation of complex organic compounds.

With the setting in of low autumn temperatures and the dying off of most of the leaves water-soluble nitrogen and phosphorus rose in proportion to total nitrogen and phosphorus in the shoots, indicating that breakdown processes took place at a maximum rate during that period. These findings are compared with those of other workers, and a hypothetical explanation is offered, based on modern views on the influence of stimulation by cold on protoplasmic structure.

In the roots, water-soluble nitrogen and phosphorus accumulated, absolutely and relatively, with the advancing season; by mid-winter 60% of the total nitrogen and over 80% of the total phosphorus were present in water-soluble form.

Fertiliser treatment, whilst not affecting the general trend of the seasonal curves to any large extent, increased both total nitrogen and total phosphorus, and their water-soluble fractions, in shoots and roots.

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*Trachypogon plumosus.*

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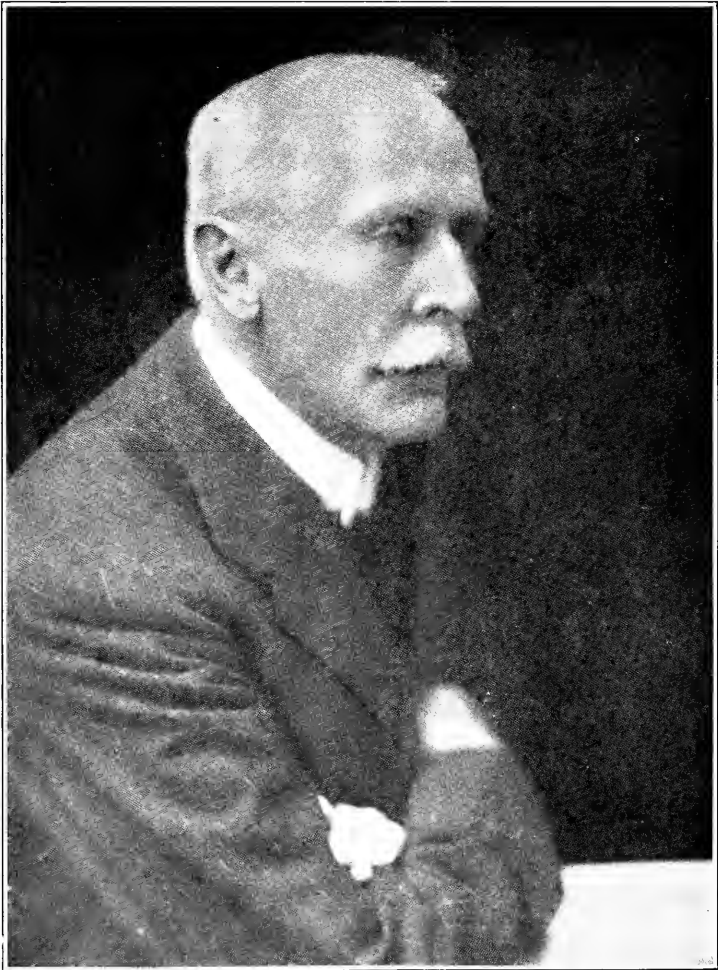


PLATE IX. Ernest Edward Galpin, D.Sc., F.L.S.



## OBITUARY.

ERNEST EDWARD GALPIN, Hon. D.Sc.,

Dr. Galpin, by profession a banker and by instinct a naturalist, was one of the distinguished band of amateurs to whom South African botany owes so much. He came of an interesting family, whose history has been chronicled by his antiquarian brother, Dr. G. L. Galpin. His grandfather was the Thomas Carter Galpin whose portraits and cartoons of Georgian times are well known to historians. His father, a civil engineer and architect who came to South Africa for his health, was a noted amateur astronomer, and set up an observatory in Grahamstown. While still in Cape Town he designed the big Conservatory which till recently was the dominating feature of Cape Town Municipal Gardens.

Dr. Galpin's boyhood was passed in Grahamstown, where he and his six brothers spent every spare moment riding and tramping over the hills. It came to an abrupt end when at fourteen he had to leave school to look after his father's business, his father having fallen ill and his elder brothers being in England completing their education. He carried on till their return four years later, when he entered the service of the Oriental Banking Corporation, later taken over by the Bank of Africa. During successive appointments in Middelburg, Grahamstown and Johannesburg he began to collect plants. Then he was appointed manager of the Barberton branch, and so fascinated by the beautiful local flora that he started to collect in systematic earnest, soon gaining a high place in the front rank of South African collectors. On the advice of Dr. Harry Bolus, to whom he used to send duplicates of all his specimens, he started the private Herbarium and Herbarium Register which later formed the nucleus of the present National Herbarium at Pretoria.

It was while he was at Barberton that he met his wife, Marie Elizabeth de Jongh, who had been sent there by President Kruger to open a school. A tireless walker and fond of open-air life, she accompanied and helped him on most of his numerous collecting expeditions. Her genial ways and knowledge of Afrikaans were invaluable in obtaining guidance and hospitality in the remote country districts they explored, and they made friends wherever they went. Mrs. Galpin died in 1933; she is commemorated by the beautiful heath, *Erica Mariae*, which was one of their finds in the Riversdale district. They had four sons, one of whom was killed in the last war.

After three years at Barberton, Dr. Galpin was transferred to Queens-town and remained there for 25 years, till his retirement in 1917. There, as at Barberton, he was able to explore extensively in a rich and diversified locality. Any leave was spent collecting further afield, from the Cape to Uganda and S.W. Africa, where he accompanied Professor Pearson in his expedition to the Namib in 1907. After retiring, he made his Springbok Flats property "Mosdene" (named after one of the Galpin estates in England) his headquarters, but continued to collect throughout Southern Africa. Apart from his longer expeditions, his usual plan was to select suitable collecting grounds and spend a month or more working the area carefully. He kept full diaries of his collecting trips, and sometimes expanded these, for the delectation of family and friends, into detailed and most entertaining narratives dealing with the scenery, adventures, plants, animals, humans, place-names etc. encountered on the way. Reading through these manuscripts, one is constantly reminded of Burchell, in language, style and careful observation; in fact "The Modern Burchell" is as descriptive of Galpin as the better-known title of "Prince of Collectors" bestowed by his fellow-collector, General Smuts. His published work is more impersonally scientific; it includes two of the Botanical Survey Memoirs, one on the Springbok Flats flora, and another on the native timber trees of that region. He also wrote on the flora of the Drakensberg, and with his son, E. A. Galpin, on the biology of *Boscia Rehmannia* and *Olea verrucosa*, two interesting "survival" indicators of climatic change in the Transvaal.

The amount of material collected on his journeys may be judged from the fact that when he presented his fine Herbarium to the nation in 1917, it already contained over 16,000 sheets of mounted and named plants collected in the Union, Rhodesia, South-West Africa, Swaziland, Kenya and Uganda; and hundreds more were added by him up to the time of his death. In addition, duplicates of each of these 16,000 specimens were sent to Kew and to the Bolus Herbarium, and many to other herbaria, for he was the most generous of collectors. Among his discoveries were well over 200 new species, including some lovely plants of established horticultural value such as *Bauhinia Galpinii*, *Plectranthus Galpinii*, *Sutera grandiflora*, *Cyrtanthus Galpinii*, all from the environs of Barberton, and *Watsonia Galpinii* from Knysna.

This remarkable achievement was recognised by the conferring of an honorary degree of Doctor of Science by the University of South Africa in 1935, and by the naming after him of the new genera *Galpinia* (Lythraceae) and *Mosdenia* (Gramineae). It represents a tremendous amount of work, and work which until 1917 had to be done in the

scant leisure of strenuous and responsible official work at the Bank. His innate love of Nature, and the method and precision of his office training, carried him through the drudgery of recording, drying, mounting and labelling; and they were combined with an energetic disposition, powers of endurance, and a capacity for taking pains which made an arduous day the normal one of his long and healthy life. Even nearing fourscore years he writes of collecting: "I am gradually growing more and more blind and deaf, but I am still active and my general health keeps good; I could almost wish it were not so; it is terrible to think that I may live on after becoming blind and deaf. When out collecting I get a native boy to carry my frame whenever possible, and instruct him to point out to me every plant he sees in flower. Many good finds I should walk over and miss but for this." Happily, sudden and painless death released him before the dark silence he dreaded could overtake him.

In spite of his busy life, Dr. Galpin found time to make and keep a multitude of friends, both personal and scientific, for he was a most lovable character. To three of these, his friend and colleague Dr. H. M. L. Bolus and his daughters-in-law Mrs. E. A. Galpin and Mrs. H. M. Galpin, I am much indebted for information and for the portrait here reproduced.

EDITH L. STEPHENS.





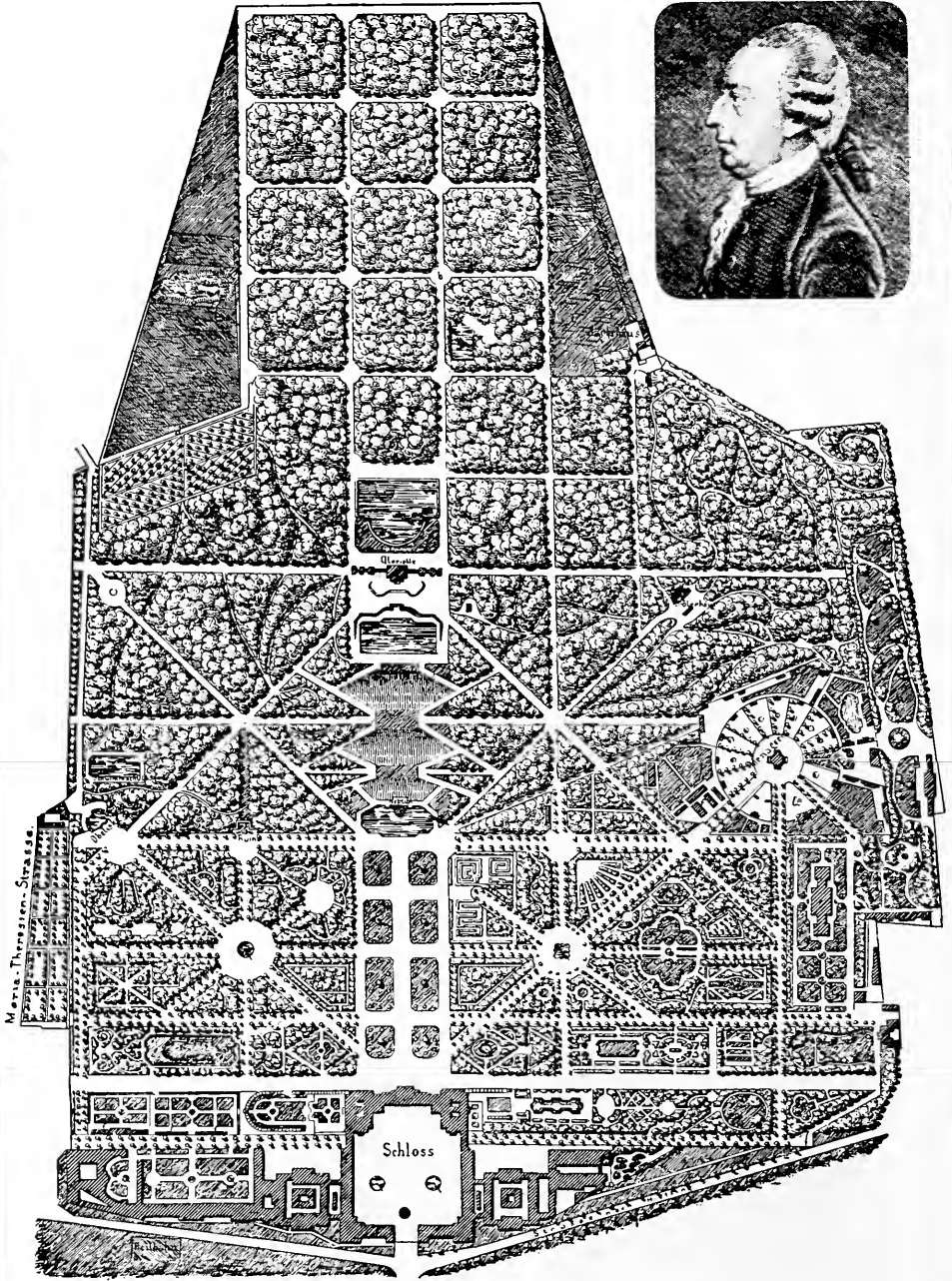


PLATE X. Plan of the Schönbrunn Gardens. Inset: Baron N. J. Jacquin.

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**BARON JACQUIN AND THE SCHÖNBRUNN  
GARDENS.**

By S. GARSIDE.

(WITH PLATE X.)

The student of the South African flora cannot proceed very far with his researches before meeting with references to the magnificently illustrated works of Baron Jacquin, in which numerous South African plants are described from material cultivated in the Schönbrunn Gardens, near Vienna.

The following account of the origin of these gardens and their development under Baron Jacquin, is written from the point of view of the South African botanist, and it recounts the circumstances in which Boos and Scholl, the two Austrian gardeners from Schönbrunn, came to visit the Cape.

**ORIGIN OF THE GARDENS.**

The Schloss or Palace of Schönbrunn and its extensive park of about 495 acres are situated about two miles to the south-west of the centre of Vienna. Originally the site of an old castle, the Gatterburg, the district, which was thickly wooded and used for hunting, was later known as the Gatterhölzl, from "Gatter", the name of the owner, and "hölzl", a small forest. The old castle, which had been totally destroyed by the Turks in 1529, was rebuilt, and a large house attached to it, which was used by the Emperor Maximilian as a hunting-box in 1570.

**EXPLANATION OF PLATE X.**

Plan of the Schönbrunn Gardens, with inset portrait of Baron N. J. Jacquin.

Reading from below upwards:—

*Median Section*: Entrance to the Palace, with main building surrounding the courtyard. The Flower Parterre of eight beds, on the south side of the Palace, terminated by the Neptune Fountain. Grass lawns with sloping walks, leading up the hill to the Water Pond and the Gloriette. Behind this, another Water Pond and the Pheasant Gardens.

*Right Hand Section*: West Wing of the Palace. Alleys of clipped trees, and to the extreme right, the Great Palm House. Beyond is the circular Menagerie, with the Botanical Gardens and Greenhouses to its right.

*Left Hand Section*: East Wing of the Palace. Alleys of clipped trees. Roman Ruins and Obelisk Fountain, with Swimming Bath beyond. Arboretum.

It was only in 1655 that the name Schönbrunn was officially given to it, and the following story is told regarding the origin of the name.

Kaiser Matthias, a grandson of Ferdinand II, was hunting in the neighbourhood of the present castle, when, tired and thirsty, he suddenly heard the splashing of water. Testing the clear, cool water, he called out, "Ei! das ist ein schöner Brunnen" ("Hi! this is a beautiful spring").

The spring has thus given its name to the park and palace.

#### THE PALACE.

In 1695 Kaiser Joseph I (b. 1678—d. 1711) commenced the building of the present palace, the architect being Fischer von Erlach (b. 1656—d. 1723). The plans were for a palace which should outrival Versailles, and the building was to be erected on the hill which stands in the centre of the present park. Because of lack of funds however, the ambitious scheme had to be modified and building was commenced on the plain below the hill. Fischer von Erlach never saw the project completed, and dying in 1723 left the task to Picassi, who was allowed greatly to simplify the plans, the building being completed between 1744 and 1750 under Maria Theresa.

As it was then the fashion to emulate the King of France at Versailles, and to spend part of the summer at a country residence, Maria Theresa made Schönbrunn her summer palace, and to this end she immediately proceeded to embellish both palace and park.

The palace, a long low ochre-coloured baroque building, consists of a central section built around a large courtyard, with wings extending to the east and west, contains fourteen hundred and forty-one apartments in rococo style, mostly furnished in white and gold with red damask, or Chinese in decoration and furniture.

#### THE PARK AND MENAGERIE.

The palace being almost complete, attention was directed to the gardens. The park already contained a collection of animals which dated back to 1552, said to be the oldest existing menagerie in Europe, but the gardens were still undeveloped. Maria Theresa consulted her scientific adviser, who was also her physician, the Hollander Gerard van Swieten, who recommended that another Hollander, Adriaan Stekhoven, the famous florist and horticulturist of Leyden, should be invited to organise the menagerie and the construction of the Imperial Gardens.

Stekhoven accepted the invitation in 1753, and working under van Swieten's direction the new menagerie and gardens were planned.



The menagerie, situated at the west side of the park, was laid out on the plan of the menagerie at Versailles, in the form of a wheel consisting of a series of radiating alleys of cages. These alleys converged on a large central octagonal building, used by Maria Theresa as a summer-house, in the basement of which were kitchens, and above these a salon where the Empress gave dinner-parties. This room had eight windows looking out on the alleys, and its ceiling was decorated with subjects from Ovid's "Metamorphoses".

The park was planned in the French style of Le Nôtre at Versailles, with flower-parterres, avenues of clipped trees, decorative fountains and garden edifices of various kinds.

#### CONSERVATORIES ESTABLISHED.

Stekhoven also constructed a number of conservatories and a hot-house for the more tender plants. These being completed, Richard van der Schot of Delft was appointed head-gardener, and he took with him to Vienna a great number of rare exotics, purchased from various nurseries in Holland, "by which means, in the very first year of its existence, the garden might already be called rich in precious vegetables".

Because of the Dutch origin of most of the original stock in the plant-houses, there were probably many South African plants introduced into the gardens long before the Austrian collectors, Boos and Scholl, visited the Cape.

#### THE BOTANICAL GARDENS COMMENCED BY FRANCIS I.

The year 1753 therefore saw the laying out of the park and pleasure gardens under Maria Theresa. This Empress, who was the last monarch of the House of Hapsburg, was married in 1736 to Francis, Duke of Lorraine, who thus became Francis I and was recognised as Emperor of Austria in 1745. From this union there were eight children, two of whom subsequently reigned in Austria, Joseph II and Leopold II, both monarchs who showed great interest in the Schönbrunn Gardens. The seventh child was the ill-fated Marie Antoinette, Queen of France.

It was to Francis I, the first Holy Roman Emperor of the House of Lorraine, that Schönbrunn owed its development as a scientific garden. "This tall, handsome man with the dark blue eyes, full lips, and high forehead beneath the lightly-powdered hair" took no part in politics or government. He "did not enjoy being overshadowed by his wife, but he had no choice. Apart from the influence and power that money can give, he had no power at all. Maria Theresa's husband resigned himself to the role of a plain unassuming gentleman, more concerned

with hunting, amusement and art than with serious political matters." It was undoubtedly in this role that he laid out the flower parterre in front of the Palace.

Then, in the year 1753, a year made famous in the annals of plant nomenclature as the year in which the "Species Plantarum" of Linnaeus was published, he also had a portion of land behind the pleasure gardens reserved as a botanical garden, and it was here that he met, for the first time, an earnest student whom he found there identifying the plants with the aid of the newly published works of Linnaeus.

This student was Nikolaus Joseph Jacquin, then newly arrived in Vienna, and who was afterwards to be styled "the Linnaeus of Austria".

#### EARLY LIFE AND EDUCATION OF JACQUIN.

Nikolaus Joseph Jacquin was born on the 16th of February, 1727, at Leyden, but came from a French family which had emigrated to Holland at the end of the seventeenth century. The talent of this brilliant botanist and plant artist was therefore of French origin.

His father was a cloth and velvet maker, who through misfortune in business lost most of his possessions. Nevertheless, Jacquin had a careful education at the Leyden Gymnasium and, later, as a medical student at the Universities of Leyden, Anvers, Louvain, Rouen and Paris.

Jacquin was never a pupil of Linnaeus however, but in Paris he had attended the lectures of Antoine de Jussieu, though these are said to have had no influence upon the direction of his botanical studies. At Leyden he was a pupil of Professor Adrian van Royen (b. 1704—d. 1779), and Nicolaas Meerberg, the Curator of the University Garden, is said to have made him acquainted with the methods of plant-drawing and engraving.

In this connection we may recall that Alphonse de Candolle (Prod. 24, p. 484) considered some of Meerberg's own plates as "icones undique pessimae", so that whatever Jacquin may have acquired here of elementary technical methods, he certainly did not imitate his teacher's style of drawing.

It was Lorenz Theodor Gronovius (b. 1730—d. 1777), son of J. F. Gronovius the benefactor of Linnaeus, who was the first to awaken Jacquin's real interest in botany, and made him resolve to devote himself entirely to that science. Gronovius demonstrated to him so skilfully the structure of the monandrian *Costus arabicus* Linn. (Zingiberaceae), that Jacquin's son later wrote of this episode that "It was the spark which kindled his inexhaustible passion for this science".

Gerard van Swieten (physician to Maria Theresa) who was a friend of Jacquin's parents, now advised that Jacquin should go to Vienna to complete his medical studies. He arrived there in 1752, being then at the age of 25, and it was while studying in the newly laid out botanical garden of Schönbrunn that he was subsequently introduced to the Emperor, who found him to be an aspiring botanist.

The Emperor soon suggested that Jacquin should make a catalogue of the plants in the Imperial Gardens, and later he asked him to lead a scientific expedition to the West Indies and the continent of South America in order to obtain specimens for the Schönbrunn Gardens and to enrich the Imperial Natural History Museum of Vienna.

#### JACQUIN'S TRAVELS.

Accordingly in 1754 Jacquin, accompanied by the gardener, Richard van der Schot, left Vienna, and travelling through Italy were joined by two Italians, John Buonamici and Ferdinand Barcelli, who had been appointed zoologists to the expedition.

They sailed from Leghorn, and visited Martinique, Grenada, St. Vincent, St. Eustatia, St. Christopher, St. Martin, St. Barthelemy, Aruba, Jamaica, Cuba and Curaçoa.

From August, 1757, to the middle of 1759, Jacquin's activities were curtailed by the war which had started between England and France, and as the ship in which he sailed was captured, he was forced to pass some time at Montserrat and the desert island of Gonave. He was also afflicted with dysentery, and his herbarium being destroyed by ants, he subsequently made water-colour drawings of the new plants which he found.

Whenever possible during the voyage, consignments of living plants were forwarded to Schönbrunn, the first of these arriving in August, 1755, from Martinique, where it was shipped from the port of St. Pierre to Marseilles, and thence to Leghorn, from which port the plants were conveyed on mules a long and arduous journey over the Alps to Vienna.

The living trees and shrubs were removed from their native soil with large balls of earth attached to the roots, which were then carefully wrapped in plantain leaves and bound with cords. A single tree generally exceeded 300 pounds in weight, so that the labour of transportation from the sea-coast over rough alpine roads to Vienna, before the days of railways, can be imagined.

In February, 1756, a second consignment under the care of the gardener, van der Schot, arrived from Martinique, and Buonamici left St. Eustatia for Leghorn with a third consignment in August, 1756. A

fourth was sent from Martinique and a fifth and sixth from Curaçoa in the months of March and August, 1757.

Jacquin himself, and his companion Barcelli who had remained with him, left Havana in June, 1759, for Ferrol, with the seventh consignment, and arrived in Vienna in July, 1759.

These cargoes are said to have formed one of the richest collections of plants ever transmitted from the tropical countries to Europe.

Jacquin's work as a collector and explorer was now becoming known, and in the year of his return from America, Linnaeus honoured Jacquin by creating a new genus, *Jacquinia* Linn. Fl. jamaic. (1759), a West Indian genus of evergreen shrubs, now classified with the Theophrastaceae. The botanical results of Jacquin's extensive American travels were subsequently embodied in his "Selectarum stirpium americanarum historia", 1763.

After Jacquin's return from America, he remained in Vienna, evidently studying the native flora there, a work which resulted in the publication in 1762 of his "Enumeratio stirpium in agro Vindobonensis".

#### THE CODEx ANICIA JULIANAE.

The Imperial Library of Vienna had long possessed one of the early Greek codices, originally obtained by purchase from Constantinople in 1569. This, one of the greatest treasures of the library, was a volume of Dioscorides, made for the Princess Juliana Anicia, daughter of Flavius Anicius Olybrius, Emperor of the West, on the occasion of her wedding, probably in the year 487.

The Codex, known as the Constantinopolitanus, or Codex Anicia Juliana, contains besides a portrait of the Princess and seven full-page miniatures in colour, three hundred and ninety-four drawings by an unknown Byzantine artist, which are probably derived from an earlier work by the Greek Krateuas, physician to Mithridates, about 120 B.C. This codex was translated into printed Latin in the sixteenth century, and John Goodyer had translated it into English between the years 1652 and 1655, this translation being preserved at Magdalen College, Oxford.

Maria Theresa ordered the pictures in the Codex to be copied as copper-plate engravings, and the work was placed under the supervision of Jacquin. On the completion of the copper plates, only two impressions were taken off, one of which was sent to Linnaeus and the other to Professor Sibthorp of Oxford. Subsequently the copper-plates were lost or destroyed and there remained only these two impressions, so that this may be regarded as the rarest work of Jacquin. The copy sent to Linnaeus passed with the sale of his herbarium and library to Sir J. E.

Smith, and is now in the library of the Linnean Society under the title "Icones plantarum ineditae, e Museo Caes. Vindoboni. 1764". The second copy was sent to Oxford, where it is now in the library of the University Botanical Gardens. This copy was the occasion of some misunderstanding, because the younger Jacquin later asked for its return to Vienna, as, he said, his father had only loaned it to Professor Sibthorp.

Professor John Sibthorp, of Oxford, visited Vienna in 1784, with a view to examining the original Codex in preparation for his study of the Greek flora, and in Feldsberg, Lower Austria, he first met Ferdinand Bauer, the plant artist (who had been drawing for Jacquin) and engaged him as artist on his Greek travels. Ferdinand Bauer drew most of the beautiful illustrations for Sibthorp's "Flora Graeca", a work which cost £30,000 to produce, and of which the first edition consisted of only 28 sets of ten volumes each.

#### JACQUIN AND THE UNIVERSITY PHYSIC GARDEN.

Jacquin left Vienna in 1763 to take the Chair of Chemistry at Schemnitz, near Dresden, where he remained for five years, and it was during his tenure of this post that the death occurred of his first patron and founder of the botanical garden of Schönbrunn, the Emperor Francis I. After the Emperor's death in 1765, Joseph II became co-regent along with his mother, Maria Theresa, and both monarchs continued to take an interest in Schönbrunn. Jacquin's only son, Joseph Franz, was born at Schemnitz, February 17, 1766.

In 1768 Jacquin returned to Vienna as the University Professor of Botany and Chemistry and Director of the Botanic Gardens of the University, which were founded in 1754,\* the first Director being Robert Laugier. Jacquin remained director from 1768 until his retirement in 1797.

Jacquin's interests now extended to the University Garden, and for several years he made a close study of the plants in it. In the years 1770, 1772 and 1776 he published each year a magnificent volume of 100 plates, hand coloured and illustrating the rarer plants of the Garden. The drawings in this work, which was entitled "Hortus Botanicus Vindobonensis" were not, however, by Jacquin himself. The first volume contains a detailed plan of the gardens. Of this rare work only

\* An earlier Hortus Medicus at Vienna was founded in 1573 by the Emperor Maximilian II, who appointed Clusius to direct it, which he did until the Emperor's death in 1576, when he became Director of the Botanical Gardens of the University of Leyden.

162 copies were printed, of which the copy in the Bolus Herbarium Library is No. 9. A few South African plants are included in the work : *Ferraria undulata*, *Tulbaghia capensis*, *Cyanella capensis*, *Ixia longifolia*, *Moraea fugax*, *Mesembryanthemum copticum*, *M. Aitonis*, *Ornithogalum thyrsoides* and *O. longibracteatum*. These are of interest because they had reached Schönbrunn long before the visit of Boos and Scholl to South Africa.

#### JACQUIN ENNOBLED CONTINUES HIS PUBLICATIONS.

In 1774 Jacquin was created Baron von Jacquin, and further sumptuous publications soon came from his hand. The illustrations of the flora of Austria, " *Flora Austriacae Icones* ", appeared in five volumes, with five hundred plates drawn by Ferdinand Bauer, in the years 1773 to 1778, followed by " *Miscellanea Austriaca* " during the period 1778 to 1781.

#### THE GARDEN ORNAMENTS OF SCHÖNBRUNN.

During the years 1775 to 1777, a considerable attempt was made by the architect Hohenburg to beautify Schönbrunn by the erection of various ornamental buildings, fountains and artificial ruins, such as were then fashionable in the royal gardens of Europe. In 1775 he built upon the summit of the hill which faces the palace (and where, according to the original plan, the palace itself should have been), the long room with glass windows, flanked by covered colonnades at each side, which is known as the " *Gloriette* ". From this altitude, 774 feet, a magnificent view over Vienna can be obtained. The *Gloriette* is 300 ft. long and 60 ft. high, and is decorated by colossal trophies ; it is approached by steps and before and behind it are broad water-ponds.

The old gardens of Italy usually made use of natural ruins of Roman origin as decorative features, but in Austria and Germany there were none of these, so that it was necessary to erect artificial ones. Thus in 1776 the " *Roman Ruins* " were built : a gigantic Roman arch supported on columns, extending over a still, reed-covered pond, from which flowed a waterfall, near which are a few sculptured figures ; the whole situated in the shadow of some old beech trees.

This was rapidly followed by several ornamental fountains : the " *Obelisk* " (1777) consists of an obelisk bearing meaningless hieroglyphics and surmounted by a golden eagle, the obelisk standing on four golden tortoises, below which issues a double-tiered waterfall ; the whole enclosed by a semi-circular wall with classic urns. The " *Neptune Fountain* " was the most ambitious scheme ; it faced the palace, and had,

as its name implies, an image of the sea-god and his retinue of Tritons, as well as fishes and shells, all spouting forth water.

Everywhere in Schönbrunn a remarkable feature was the alleys of tall clipped, wall-like trees, mostly limes and beeches, with numerous green alcoves containing statues, which were also pseudo-antique. The flower-parterre alone contained thirty-two of these.

#### STOVE PLANTS KILLED ACCIDENTALLY BY FROST.

The Empress Maria Theresa died on the 29th of November, 1780, and in the same year, some little time before her decease, the green-houses of Schönbrunn suffered a very considerable loss. The head gardener, who was now advanced in years, was confined to his room for several weeks with an attack of gout, and on one of the coldest winter nights the fires of the large hot-house were allowed to die down. The fireman, to make amends for the omission, heated it up all the more the next day, and by this sudden transition from cold to heat a large number of the most valuable plants were destroyed, including all the cinnamoms from Martinique, with stems the thickness of an arm, species of *Crescentia*, *Achras*, *Anona*, *Portlandia* and a 20 ft. high *Coccoloba grandiflora*.

Another great loss to the gardens about this time was a cargo of tropical trees and seeds sent from Mauritius by M. Céré, who was the Director of the Botanic Garden of Pamplemousses. On arrival all the plants and seeds were found to be dead.

#### THE GARDENS UNDER JOSEPH II.

After the death of the Empress, her son Joseph II, who had reigned with her for fifteen years, now became sole monarch. He reigned for ten years more, and it was during this period that further expeditions for the collection of plants, including the visit of Boos and Scholl to the Cape, were undertaken. Stekhoven, the first head gardener, died in 1782, and Francis Boos, who had already been working as a gardener at Schönbrunn for six years, now came to the fore.

#### EARLY LIFE AND AMERICAN TRAVELS OF FRANCIS BOOS.

Francis Boos was born on December 23rd, 1753, at Frauenalp, Baden; his father, a head gardener at Rastatt, educated him for the same profession, and he was sent as an under-gardener to Schönbrunn in 1776. When Joseph II asked Jacquin to propose able naturalists to undertake a voyage to distant countries, Boos was fortunate enough to be appointed one of the party, along with another gardener, Francis Bredemeyer.

Professor Francis Joseph Märter was chosen as scientific director of this expedition; associated with him were Dr. Matthew Leopold Stupicz and Dr. Moll, the draughtsman.

The party quitted Vienna in April, 1783, and arrived in Philadelphia the following September, from whence they made excursions into Pennsylvania, Virginia and Carolina. Bredemeyer returned from Carolina to Europe by way of England, and arrived in Vienna in November, 1784, with a fine cargo of plants. Boos, who had resided eight months in the Bahama Islands collecting rare plants, returned to Vienna in 1785.

At the end of 1784, Bredemeyer and another gardener, Schücht, again joined Märter, who was still in America, and visited the mouth of the Orinoco, returning to Vienna in 1788.

#### BOOS AND SCHOLL GO TO THE CAPE.

To make up for the loss of the plants from Mauritius already mentioned, the Emperor Joseph II now ordered Boos, accompanied by a gardener, George Scholl, to visit that island, and to bring back with them a large collection of tropical plants which M. Céré, the Director of the Gardens there, had made. It may be remarked here that almost all the more recently published accounts of the visit of Boos and Scholl to South Africa give the impression that these collectors were sent on a special mission to that country, but the brief original statement made by Jacquin does not support this; they were, as noted above, sent primarily to Mauritius, and were only to call at the Cape incidentally.

Of the two men, Francis Boos was evidently the leader of the expedition, as he was a man of some education and spoke several European languages: he was a botanist as well as a gardener, and his previous experience in America also qualified him for leadership. Scholl was a working gardener, with probably very little scientific knowledge of plants, though it is interesting to note that after the two men arrived at the Cape, they were politely designated in the Cape Archives as "the botanists of his Imperial Majesty".

Boos and Scholl arrived in Cape Town in May, 1786, and most unfortunately there was never published any detailed account of their travels, nor do the Cape Archives, which have been examined for the first time in this connection by the present writer, give us any help in this matter. The numerous South African plants (often new species) grown at Schönbrunn from seeds and plants taken to Europe by Boos, or sent later by Scholl, and subsequently described by Jacquin (chiefly in *Icon. Plant. Rar. and Hort. Schön.*), are almost all recorded as from



“ the Cape of Good Hope ”, without any further information. Unless, therefore, there is an unpublished diary in Vienna the exact nature of the journeys made by the two collectors must remain somewhat uncertain.

#### TRAVELS OF BOOS AND SCHOLL.

With our rapidly increasing knowledge of plant distribution in South Africa, it is, however, possible, by a consideration of the plants they collected, to form some general estimate of the area traversed. The first to suggest and apply this method was the late Dr. O. Stapf who, after deploring the absence of a published itinerary says (Bot. Mag. t. 9127, 1926): “ That if the now known habitats of the thirty South African species of *Arctotis* described by Jacquin are tabulated, we obtain a rough idea of the collecting grounds of the two Austrians of which there are otherwise no records available . . . they must have extended from Cape Town northwards to the Khamiesberg and very probably beyond it to near the Orange River ”.

Paymaster-Captain T. M. Salter, who has an unrivalled field knowledge of *Oxalis* in South Africa, has also very kindly undertaken a similar analysis of the distribution of those species of the genus which are described in Jacquin's “ *Oxalis Monographia* ” (1794), a work published before Scholl returned to Europe. Captain Salter considers that it may be assumed from the date of the “ *Monographia* ” that almost all the South African species of *Oxalis* described in that work were obtained on the expeditions which Boos and Scholl made together, or they were sent over later by Scholl, though it is probable that a few of the commoner species were already at Schönbrunn, having been derived from the Dutch gardens.

The species published by Jacquin indicate that Boos and Scholl probably took the old route to the west of Piquetberg and Olifants River Valley, and after passing near Klaver and Van Rhyns Dorp kept some miles to the west of the present road to Namaqualand; a route also followed later by Zeyher, at least as far as Garies. This seems to be borne out by such species as *O. glandulosa* Jacq. and *O. cuneata* Jacq., both of which have only been rediscovered by Captain Salter about twenty miles to the west of Bitterfontein and Garies respectively, although, of course, the range of these species is not yet exactly known. As regards the northern limit, all Jacquin's Namaqualand species occur between Garies and Kamieskroon.

It is not generally known to South African botanists that Boos, on his travels in South Africa, made “ eine schöne Sammlung südafrikanische Pflanzen ”, which collection of dried plants was subsequently

housed in the Imperial Museum of Vienna. Wild specimens of *Oxalis* are preserved in this collection, and they indicate that the collectors must have been in the Van Rhynsdorp Division and Namaqualand about May, June and early July. The absence of a number of common species, which must have been observed by a slow-travelling party on this route, is probably explained by the bulbs dying off or failing to flower. Indeed, judging from recent attempts to cultivate South African *Oxalis* bulbs in England, it is surprising that Jacquin had the success he did. There is a very human absence of most of the species in which the bulbs lie very deep in the hard soil and can only be obtained with the expenditure of much time and patience. At least half of the species of *Oxalis* described by Jacquin have seeds which lose their power of germination in a few days, so that it is obvious that these must have been grown from bulbs, but it is highly probable that all were so grown, as *Oxalis* seeds are difficult to collect in quantity.

Both Stapf and Salter agree therefore regarding the terrain visited by the two collectors, but although they obviously visited Namaqualand during the flowering season, we must not infer that all the plants described by Jacquin from this district were collected during this one journey only. As we shall see later, Scholl had ample opportunity for further visits.

#### BOOS STAYS ONLY ONE YEAR AT THE CAPE.

Boos and Scholl arrived at the Cape in May, 1786, but Boos remained only one year, leaving again early in 1787 to proceed to Mauritius and Bourbon to obtain the plant collections which were the original object of the voyage, leaving Scholl behind at the Cape.

#### THE 280 BOXES OF PLANTS.

Boos was back again at the Cape in January, 1788, having been away a little less than a year, and he brought with him 280 boxes of tropical plants. It is repeatedly stated in works dealing with South African plants that Boos and Scholl collected 280 cases, or "almost 300", of plants at the Cape, which could not all be shipped on the boat in which Boos sailed, so that Scholl was left behind at Cape Town with some of the cargo, and he was to sail later.

It is clear from the statement made by Jacquin that the 280 cases contained the plants from Mauritius and Bourbon, and were not the Cape plants of Boos and Scholl's travels. Boos and his cargo of plants arrived in Vienna in July, 1788, so that his second visit to the Cape must have

been an exceedingly short one, and it would not appear that any long excursion could have been made on this occasion.

#### BOOS AND SCHOLL IN THE CAPE ARCHIVES.

If we now turn to the meagre references to the Austrian collectors which appear in the Cape Archives, we find an interesting note, dated Tuesday, 11th December, 1787 (Archives, Resolutions C. 82, pp. 927-928) : " Further we undertake to attend dutifully to the instructions in their Honours' letter . . . in regard to giving all assistance to the botanists of his Imperial Majesty at present here, such as their Honours have permitted in order to send over the collections made here, both of the plant and animal kingdom." This resolution was evidently passed in anticipation of the impending departure of Boos, and it may be noted that this is the only reference to the two men; all subsequent references concern Scholl only. The mention of the animal kingdom in the above Resolution is of some interest, for although there are no records as to exactly what animals were taken to Europe, we shall learn later that several South African mammals and birds were in the Schönbrunn Menagerie soon after Boos returned from Africa, and it may be that these were in the cargo he took with him.

#### SCHOLL REMAINS AT THE CAPE.

Scholl then was left behind to collect and to take charge of the remainder of the plants from Mauritius. Probably because of the difficulty of getting a ship sailing to a port with easy access to Vienna, his stay at the Cape was much more prolonged than was originally intended, for he remained for twelve years in all, returning to Vienna in 1799.

It would be of great interest to know how Scholl spent his time during his long residence at the Cape. There are only a few details available which allow us to form some opinion; we know from the Cape Archives that he sent several cases of bulbs and seeds to Vienna, and we have Jacquin's statement (Jacq. *Stapeliarum*, 1806) that he travelled in Namaqualand and Kaffirland, and that he made journeys with Gordon and with Masson, and also alone. The living plants he collected were cultivated in Gordon's garden in Cape Town.

#### COLONEL ROBERT GORDON.

Boos and Scholl, who were both strangers to South Africa, obviously could not set out to explore the interior of the country without a reliable

guide. We know from evidence already given that a first journey to Namaqualand was made almost immediately after their arrival in the country, and Captain Gordon seems to be the person who most probably acted as their guide.

Captain (later Colonel) Robert Gordon (b. 1741) was exceptionally well qualified to act in this capacity. He was a Dutchman of Scottish extraction, born in Guelderland, who for eighteen years was in the service of the Dutch Netherlands and later in life in command of the troops at the Cape. He accompanied Lieutenant Paterson on his first journey into the interior in 1777, and later on his fourth journey in 1779. They went as far as the Orange River, so that Gordon must have known this country well. Paterson described Gordon as "an intelligent companion and a gentleman of extensive information in most branches of natural history and I believe is the only person who has any considerable knowledge of the interior parts for near one thousand five hundred miles from the Cape. He had acquired the language of the Hottentotts, which, together with his perfect acquaintance with the Dutch language, gave him an advantage over most other travellers." Thus Gordon, who knew the country so well, and who spoke German, French and English, as well as Dutch, seems to have been the only one who could have conducted the Austrians over the region where we know their first journey to have been made, though we must remember that so far there has been discovered no precise statement to this effect.

This then is about all we can say regarding the guide and routes followed by Boos and Scholl during the stay of one year made by Boos at the Cape.

#### SCHOLL'S TRAVELS.

Regarding Scholl's travels after Boos returned to Europe there is also no certain information beyond the statement of Jacquin already quoted, that he travelled with Masson as well as Gordon. Masson arrived for his second visit to the Cape on January 10th, 1786, only four months before the arrival of Boos and Scholl, but unfortunately he left no detailed account of his second visit (from 1786 to 1795) as he did of his first (from 1772 to 1774), or we might look for mention of Scholl therein.

Colonel Gordon shot himself (October 5th, 1795) when the English took the Cape, owing apparently to chagrin regarding some misunderstanding which had arisen as to his conduct during the campaign. After his death his wife, a Swiss lady, departed for England on her return to her home country, taking with her all Gordon's manuscripts, water-colour drawings of plants and animals, as well as maps and charts of routes

followed between the years 1777 and 1790, a period which covers a portion of Scholl's visit. Gordon intended to publish these documents, but this was never done, and they were sold by his wife to a private purchaser, and many years later came into possession of the Dutch Government and were added to the Archives in Holland. (*Journ. Bot.* 1914, p. 75.) It may be that we should find in these documents some clue to the travels of Boos and Scholl and to the journeys made by Gordon and Scholl, but so far it has not been possible to examine these remains.

#### GORDON'S GARDEN.

The care of the plants from Mauritius and of the bulbs, succulents and other plants which Scholl accumulated would no doubt provide him with much occupation. John White, in "Journal of a Visit to New South Wales" (1790, p. 90) gives a brief contemporary reference to Gordon's garden, where Scholl's plants were accommodated. White visited the garden in 1787, the year after Scholl's arrival, and says that "the garden displays not only the taste and ingenuity of the gardener, but the skill and knowledge of the botanist". Unfortunately, the exact site of this garden in Cape Town is at present unknown. Scholl no doubt obtained seeds from this garden to send to Vienna, and it is extremely probable that some of the curious and possibly hybrid *Stapelias* raised in Vienna from South African seed sent by Scholl may have had their origin there, where conditions for hybridisation must have been very favourable.

#### SCHOLL'S SHIPMENTS OF BULBS TO VIENNA.

From time to time Scholl sent shipments of dried bulbs and seeds to Vienna, but there are no records of growing plants being forwarded; indeed, this must have been impossible without a gardener to travel with them. Exactly how many shipments of seeds and bulbs were made we do not accurately know, but the Cape Archives record only four; a small number considering the length of time that Scholl was resident at the Cape. The records are as follows:—

Cape Archives, Resolutions.

C. 87. pp. 128-129. 2 Feb. 1790. Three boxes and three baskets to be sent to the Netherlands.

C. 91. p. 34. Monday, 18 April, 1791. Giving permission to George Scholl to send by homeward-bound vessel, one case of seeds addressed to Herr Carli de Carlo at Amsterdam.

C. 96. p. 388. Wednesday, 8 Feb., 1792. Permission to send flower bulbs to the Consul of His Majesty the Emperor at Amsterdam.

C. 96. p. 415. 10 Feb., 1792. Permission to send one case and one package of flower bulbs and seeds to Herr Phelix de Carsie, Consul to His Majesty at Amsterdam.

It is not clear whether the last two records, 8th Feb. and 10th Feb., 1792, refer to the same consignment or not; if to the same consignment, then the recorded shipments are reduced to three. It will be noticed that the parcels are sent to the Austrian Consul at Amsterdam, who would forward them to Vienna.

#### SCHOLL'S RETURN TO EUROPE DELAYED.

There appears to have been some difficulty, the nature of which is not quite clear, about the return of Scholl to Europe. He remained at the Cape throughout the British occupation in 1795 and for four years afterwards, whereas Masson departed for Europe with his plants at the first sign of hostilities, fearing, no doubt, to lose his collection.

The difficulty mentioned was probably that of obtaining accommodation for Scholl's large collection of living plants in a vessel which was bound directly for a continental port. An effort to get Scholl and his plants back to Europe was made in 1791, when the Emperor Leopold, who had succeeded Joseph II (d. 1790), ordered the gardeners Braedemeyer and Joseph van der Schot (son of the deceased first head gardener) to go to Mauritius, where M. Céré had again made a collection of plants for the gardens, and on the way out to call at the Cape and bring Scholl home. This projected voyage came to nothing, as owing to trouble with the ship's captain in the Mediterranean the two gardeners were forced to return to Vienna. The plants from Mauritius were subsequently shipped, but the vessel was wrecked off Cape Agulhas on April 20th, 1794, and the entire cargo lost.

#### SCHOLL RETURNS TO EUROPE.

There is no record in the Archives as to the exact date when Scholl sailed, and the route he took is also uncertain, but he arrived in Vienna in 1799, bringing a large collection of living plants, some of which had suffered considerable damage during their long voyage. The "indefatigable Scholl" (Jacquin's expression) was rewarded by promotion to the post of Superintendent to the Gardens of the Belvidere Palace, a post which he still held in 1806, but the present writer has been unable to ascertain the exact date of his retirement and decease.

## CONTEMPORARY TRAVELLERS.

Before we conclude this account of the South African visit of Boos and Scholl, it will be well to note the chronological position it occupies in the long series of visits made by European travellers about this period. When the Austrians arrived the travels of Francis Masson (first visit, 1772-1774), C. P. Thunberg (1772-1775), Andrew Sparrmann (1772-1776), William Paterson (1777-1779), and Le Vaillant (1780-1785) were over; those of Henry Lichtenstein (1803-1806) and William Burchell (1810-1815) had not begun.

At the end of Scholl's residence at the Cape, Sir John Barrow's travels (1797) were undertaken. Botanists and collectors visiting the Cape during this period were few; Dr. William Roxburg (1798-1799) and his son James Roxburg (1798-1804) were amongst these, also James Wiles, botanist on the "Providence", which visited the Cape on its outward journey in 1791. Another famous collector, James Niven, collecting for G. Hibbert, arrived for his first visit in 1798, about the time Scholl departed, and remained till 1803. Masson's second residence at the Cape is therefore the only outstanding botanical event which coincides with the visit of Scholl, and Masson left no detailed record of this period. The visit of Boos and Scholl fills a gap between the travels of Le Vaillant and those of Lichtenstein, and the absence of a detailed account of their activities is therefore all the more to be deplored.

## FERDINAND AND FRANCIS BAUER.

We must now consider events at Schönbrunn after the return of Boos in July, 1788. In this year Jacquin's son, Joseph Franz, now 22 years of age, qualified as a Medical Doctor at the University of Vienna.

At the suggestion of Joseph II he then undertook, in the years 1788 and 1789, a scientific journey through Germany, France and England, during which he sent a considerable number of exotic plants to Schönbrunn. The young Jacquin took with him to England the botanical artist Francis Andreas Bauer, whose brother, Ferdinand Lucas Bauer, was already employed at Kew by Professor Sibthorp (with whom he had travelled in Greece, 1786-1787), making drawings for the "Flora Graeca". Francis met Sir Joseph Banks in London, who offered him the post of draughtsman at Kew, which he accepted and remained there for the rest of his life (d. 1840). Ferdinand later accompanied Robert Brown as botanical artist on the voyage to Australia under Captain Flinders (1801-1805) and subsequently (1814) settled at Hietzing, near Schönbrunn, carrying on his profession of botanical artist and completing the

drawings of Australian plants, Lambert's "Pinus", Lindley's "Digitalis" and other works. He died on 17th March, 1826, his herbarium of 2,000 specimens being purchased for the Imperial Museum of Vienna. Ferdinand Bauer drew many of the plates (unfortunately unsigned) for Jacquin's works.

The talent of these two famous plant artists was evidently inherited, for their father, Lucas Bauer, was a painter to the court of Prince Lichtenstein, and director of the Prince's picture galleries. He had three sons, Francis, later artist at Kew, Ferdinand, who settled near Schönbrunn and Joseph, who succeeded his father as director of the above-mentioned picture galleries. In the Lichtenstein Picture Gallery in Vienna there are 14 folio volumes containing 2,750 original drawings labelled "Hortus Botanicus, a Josepho, Francisco et Ferdinando Bauer pictae, 1777-1804". It is probable that the original drawings for a large number of Jacquin's plates are in these volumes, but they have never been examined from this point of view.

#### DEATH OF THE EMPEROR JOSEPH II.

The year 1790 saw changes and new appointments at Schönbrunn. Very early in the year the Emperor appointed Boos to be Director of the Menagerie. On the 19th of February the head gardener, Richard van der Schot, who had come to Schönbrunn from Delft, died, and the following day the Emperor Joseph II passed away. With the death of the Emperor the gardens lost an enthusiastic supporter and patron. He had initiated during the last ten years of his reign the successful scientific journeys to America, to Mauritius and Bourbon and to South Africa, besides losing no opportunity of acquiring rare plants from the gardens of Europe. In order more suitably to display the plant collection, he caused a magnificent palm-house to be erected, then the finest in Europe, and it was he who first opened the Gardens and Menagerie of Schönbrunn to the public.

#### EMPEROR LEOPOLD'S SHORT REIGN.

Joseph II was succeeded by his brother, Leopold II, who reigned only two years. It was Leopold who ordered the voyage (which proved abortive) for the return of Scholl from the Cape. He was succeeded in 1792 by his son Francis II, who reigned till 1835. Francis II erected the temperate plant-houses intended more especially for the reception of plants from South Africa, of which Schönbrunn then had a large collection.



## CONTEMPORARY ACCOUNT OF SCHÖNBRUNN.

We are fortunate in having a contemporary account of the Schönbrunn plant-houses, then at the height of their glory, from the pen of a visiting Englishman, Robert Townson, geologist, botanist and traveller, who was at Vienna in 1793. After examining Jacquin's collection of minerals at the University, he says that "The environs of this city are not less rich in the productions of . . . the vegetable world, than the city itself is in those of the mineral; and the Imperial Garden of Schönbrunn I think even surpasses the Imperial collections I lately described. It is only an hour's walk from Vienna and in the severe winter of 1793 I often went there to enjoy the beauties of a tropical climate. What a pleasing contrast when, from being battered with a driving sleet or covered with snow on my way thither whilst the vegetable world was dead, and the very earth was hid by snow from my sight, I stepped into these hot-houses, rich with odours and adorned with the rarest palms." He considered the large hot-houses to be the finest in the world, as they undoubtedly were at that time. One was 270 ft. long and 30 ft. high. This may be compared with the Great Palm House at Kew, completed in 1848, of which the entire length is 362 ft., with wings 30 ft. high and a central portion 66 ft. high, or Paxton's Great Conservatory at Chatsworth House in Derbyshire (completed 1840, demolished 1923) which was 277 ft. long and 67 ft. high. Townson says that there was another glass-house almost as large as the first, as well as three ranges of glass-houses, each 240 ft. long, but not as high as the others, and two or three small alpine houses. He remarks on the magnificence of the palms, giving a list of about 65 tropical and sub-tropical shrubs and trees which specially impressed him with their luxuriance, among them being *Cassine capensis* L., a species which had been in cultivation in the Leyden Garden since 1608. He also gives a long list of other plants, amongst them being *Adansonia digitata*, *Asparagus capensis*, *Bauhinia aculeata* and *porrecta*, *Ceropegia sagittata*, *Chironia frutescens*, *Euphorbia caput-medusae*, *Ficus benjamina*, *Gardenia Thunbergia*, *Protea argentea*, *Levisanus* and *saligna*, *Sophora capensis*, *Tamus elephantipes* and "an immense number of bulbous plants from the Cape, and a rich collection of the genera Arum, Arctotis, Erodium, Geranium, Oxalis and Pelargonium".

He also remarks on the variety of rare birds flying about in the conservatory, some of which were breeding there; nightingales were kept, and long-tailed doves from the Cape. Other species of birds were in cages and a few chained. Amongst the plants he remarks on *Aponogeton distachion* "from the Cape", growing in a fountain basin outdoors, which withstood the very severe freezing of the winter of

1793, and which was covered with ice until the middle of March. Despite this, the plant flowered on the 4th of April of the same year.

It appears from Townson's narrative that the Botanical Establishments of Schönbrunn and the University had recently been severely criticised in the 14th number of Baldinger's Physicians' Magazine, "where Mr. Jacquin is treated with great severity"; Jacquin was, of course, Director of the University Garden at that time. Mr. Boos also came in for criticism, the nature of which can be inferred from Townson's comment, "That it should not be permitted to every one to go into the hot-houses alone, or to help themselves to the specimens, is not an unnecessary regulation for a garden so near to one of the most populous cities of Europe. But if it be difficult to get admittance into the garden of the University without a well powdered head and an embroidered coat (which with the old Jacquin, I think, would be a small recommendation) when love for science should be considered as the first claim, it is not so in the garden under the inspection of Mr. Boos". Here follows a delightful tribute to Francis Boos: "His time, which is much taken up with this extensive establishment (the Menagerie being likewise under his care), and with the number of strangers and people of fashion who come to see it, is at the service of every scientific man who will call upon him, and specimens of plants likewise, if they can be spared, without his ever thinking of receiving a gratuity for his trouble". Further, "He seems to fulfil his charge both to his master and to the public, with great zeal and propriety; he is particularly attentive to strangers, and speaks three or four modern languages. I am, like other travellers, indebted to him for civilities, and for several specimens of rare plants. He has about twenty men under him."

We are told by Townson that a part of the garden supplies the table of the Court, and that the Menagerie contains many species of birds and animals, including some from South Africa: two zebra, a quagga, two porcupines and also an ostrich. It is just possible that these animals accompanied Boos on his return from Africa in 1778.

We learn, too, that in 1793 the Gardens "were open to the curious at all times, and more particularly on Sunday for the common people".

#### MARIE ANTOINETTE.

Reading Townson's graphic account of the beauties of Schönbrunn, it is sad to reflect that in the year of his visit, a daughter of the Imperial House of Austria and sister to the late Emperor Joseph, the ill-fated Marie Antoinette, Queen of France, went to the guillotine on October 16th, 1793.

The Queen's love of Schönbrunn, her childhood's home, never left her, and it seems to have found expression in a peculiar fashion.

André Michaux (b. 1746—d. 1802) had been commissioned by the French king to collect plants for the Royal Palace and forest of Versailles and Rambouillet. When, from 1785 onwards, these arrived in Paris, it is said that Marie Antoinette sent most of them to beautify the gardens of Schönbrunn; the few remaining at Versailles ultimately perished from neglect. Michaux sent over 70,000 young trees, spending the whole of his own private resources in doing so, but never received the smallest payment from the King. This episode in the life of the famous Queen usually remains unrecorded by her numerous biographers.

#### JACQUIN'S STAPELIAS.

In 1799 Scholl returned to Vienna, bringing with him a large collection of living *Stapelias*. Jacquin began to publish the results of his study of these plants in 1806, but the fifth section of the work was only completed by his son in 1819, after Jacquin's death.

The complete work "*Stapeliarum in hortis Vindobon. culturarum descriptiones, etc.*," contains 64 coloured plates, and with a view to obtaining, if possible, some indications as to the districts from which Scholl obtained these plants, Mr. N. S. Pillans has examined the work for the present writer, and has expressed the following opinion: The species described and figured are not so local that any well-defined collecting area is indicated, and there is a remarkable absence of the species of *Hoodia*, *Caralluma*, *Pectinaria* and *Trichocaulon* from the Karroo and Namaqualand. Many of the plants are stated to have been grown from seed sent by Scholl, the exact origin of which is unknown; it is possible that much of this seed was collected in Gordon's garden from the plants growing there; plants which may even have been collected by Gordon himself. *Stapelia lepida* Jacq. was grown from seed at Schönbrunn, and has never been found again; it may have had a hybrid origin in Gordon's garden, as already suggested. Scholl therefore does not show up well as a collector, judging by the *Stapelias* of Jacquin.

#### DEATH OF BARON JACQUIN.

Baron Jacquin's last work dealt with the pollinia and reproductive organs of *Asclepiadaceae* (*Genetalia Asclepiadearum controversa*, 1811), and he retained his interest in this group to the end of his life.

He died at Vienna on October 26th, 1817, and Lasègue tells how the old Baron, when he had been on his death-bed for many days without the

power to speak or move, at last found energy to enquire "whether there were any more *Stapelias* in flower".

Baron Jacquin retired from active work as Director of the Gardens in 1797, and his son, who had acted as his assistant from 1791, succeeded him. After his retirement, in addition to the monograph on *Stapelias*, he continued to produce important botanical works, including the completion of the *Hort. Schön.*, Vol. III (1798) and Vol. IV (1804); and the *Plant. Rar. Hort. Schön.*, 4 Vols. (1797-1804) was undertaken, containing a large number of South African plants, grown mostly from Scholl's bulbs and seeds, and flowering for the first time. Very few of the delicate bulbous Liliaceae, Amaryllidaceae and Iridaceae can have survived for a long period in Vienna, and the same is true of many of the annuals; it would be of interest to know how many of the plants which date from the Scholl period are still there. A plant of *Fockea crispa* (Jacq.) K. Schum. probably brought by Scholl in 1799 and known to have been cultivated since 1800, was still there in 1904, so that it had then lived at Schönbrunn over one hundred years.

#### JACQUIN'S HERBARIUM.

Jacquin's own herbarium, consisting of plants cultivated by him in Vienna, and some of his American plants, was purchased by the wealthy English collector, Aylmer Bourke Lambert (b. 1761—d. 1842). At his death, his herbarium was sold in lots, and Sir Joseph Banks acquired the herbarium of Jacquin, which is now in the British Museum. The Linnean Herbarium also contains plants sent by Jacquin to Linnaeus.

Berlin (Dahlem) has a large number of original specimens of Jacquin, in the herbaria of Willich and Weiss, and of Willdenow.

#### JACQUIN'S ARTISTS.

The "Linnaeus of Austria" had, during his lifetime, completed the publication of almost 3,000 large folio hand-coloured copper-plate figures of plants. His publications reach the high-water mark of excellence for this method of plant illustration, which was soon to be succeeded by the newer methods, as used by Redouté, of direct colour printing from stippled plates, completed by a few strokes added by hand.

Jacquin himself was a brilliant artist; his private letters to botanists (some of which, addressed to J. Dryander, are in the British Museum) were embellished with beautifully coloured figures of the plants he was discussing.

Few of his published figures were his own work, but the "Observa-

tionum botanicarum" (1764-1771) contains some uncoloured figures of plants which have Jacquin's signature; the plates of the "Stapelium descriptiones" are also said to be by Jacquin.

Unfortunately, most of the plates in Jacquin's works are unsigned, so that the identity of the artist for each plate is not always exactly known, although Jacquin tells us something in a general way regarding the artists he employed.

Ferdinand Bauer executed the plates of the "Historia stirpium Americanarum" from the original water colours of Jacquin, and Francis Scheide, who accompanied Jacquin on his alpine journeys, drew all the plates for the "Flora Austriaca", with the exception of Wulfen's contribution. He also drew the plates for the "Horti Botanici Vindobonensis". Joseph Hofbaur did all the first volume and the first four fascicles of the second volume of the "Icones plantarum rariorum".

Johannes Scharf, who as a boy had worked in the kitchen of a monastery, was trained by Jacquin in the elements of botanical and microscopical technique, and drew from 1789 till his death, by consumption, in 1794. He drew all the remaining plates of the "Icones plantarum rariorum", about 180 plates of the "Hortus Schönbrunnensis" as well as all the plates for the "Oxalis monographia" (1794).

Martin Sedemeyer completed the drawings for many of Jacquin's still unfinished works. Many engravers worked for him, the best being Jacob Adam and Ignatius Albrecht.

#### END OF THE JACQUIN RÉGIME.

Boos for his services was made a Royal Councillor in 1810, and in addition to his duties as head of the Imperial Gardens he was occupied with the compilation of a Schönbrunn Flora, published in 1816. In 1827 he retired, and died in Vienna, 23rd February, 1832.

The scientific publications of Baron Joseph Franz Jacquin, Baron N. J. Jacquin's only son, were comparatively few. He was the author of "Eclogae plantarum rariorum", containing descriptions and coloured figures of new and rare plants which flowered in the Gardens, and also published books on birds, grasses and the Ginkgo tree.

The scientific soirées had been instituted by the old Baron as a means of securing an exchange of views between the scientists of Vienna, and this custom was continued by his son. An account is given by Francis Trollope (Vienna. Vol. I, 1838) of one of the last of those conducted by Baron Joseph Franz, on January 10th, 1837. The soirées were held at Jacquin's house, one every week, with a large attendance. Jacquin was then "a venerable and intelligent-looking gentleman with a small

black cap on his head, which converted him into a very perfect Rembrandt. He did the honours, gave them a taste of some Manna of the Desert in the state it exuded from the parent tree, and showed parts of the tree itself".

In 1838 Baron J. F. Jacquin retired, and died in Vienna, 9th December, 1839, being then 74 years of age. His herbarium, said to contain many duplicates of the plants described by his father, is in the Imperial Museum, Vienna.

He was succeeded by Stephen Ladislaus Endlicher (b. 1804—d. 1849) as Professor of Botany and Director of the Botanic Garden.

My grateful thanks are due to Dr. Graham Botha, Chief Archivist for the Union of South Africa, for valuable information regarding Colonel Gordon and for permission to consult the Archives, also to his assistants for their ready help, and to Miss Jeffries for the translations; to Dr. L. Bolus for the use of the works of Jacquin in the Bolus Herbarium Library; to Mr. Leslie Grey for the loan of White's "Visit to New South Wales"; to Professor R. H. Compton for photographs and maps; and to Paymaster Captain Salter and Mr. N. S. Pillans for their expert opinions on the geographical distribution of the species of *Oxalis* and *Stapelia* of Jacquin.

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## SEAWEEDS OF POSSIBLE ECONOMIC IMPORTANCE IN THE UNION OF SOUTH AFRICA.

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Except in Japan, where seaweeds are extensively collected and even cultivated, seaweeds do not constitute an important economic asset. Further, in most cases, although not in all, substitution can be made for seaweed products. Under a war-time economy, however, seaweeds have in the past been of considerable importance in countries other than Japan, notably the United States of America. Under similar circumstances some seaweeds might prove of importance to us while others might also have some value.

The present survey is made with the above considerations in view. We are not here concerned with the advisability of exploiting the various species but to indicate what species of possible economic value occur on our shores, together with a consideration of their geographical distribution and abundance. We are aware that in this regard there are gaps in our knowledge. Certain economic aspects of seaweed utilisation have recently been dealt with in a bulletin issued by the New Zealand Department of Scientific and Industrial Research (Moore, 1941).

A consideration of our seaweed resources entails a brief consideration of the environmental conditions around our shores. The algal species and the amount of seaweed vegetation are affected by three important sets of factors :—

1. The tidal range.
2. The character of the sea water, especially its temperature.
3. Geographical position.

The tidal range affects only the seaweeds growing above the low-water level of spring tides. This range may be quite considerable. Thus, in many parts of Britain it may be between 20 and 40 ft. at its maximum. The tidal range along the coasts of the Union is narrow. From Cape Town north-westwards the tidal range increases from 4·6 ft. to 5·7 ft. at Cape Frio (18.25 S) about 18° south of the equator and thus considerably beyond the northern limit of the Union. From Cape Town to Durban also the tidal range increases, reaching 5·6 ft. in the

latter locality and still increasing in a northerly direction, it reaches 11.9 ft. in Delagoa Bay (Bauer 1933). This narrow tidal range restricts the inter-tidal area available for seaweed growth.

Sea temperatures and the composition of the sea water vary considerably around South African coasts. The west coast is subject to the cold Benguela current, which is a slow moving body of water of sub-antarctic origin. In a northerly direction, from Cape Point to Port Nolloth, the colder waters move nearer to the surface with a consequent decrease in sea temperatures. The east coast and the south coast as far as Cape Agulhas are directly affected by the warm waters of the fast flowing Agulhas current. The effect of these ocean currents on coastal sea temperatures is realised if we compare the average sea temperature at Durban (29.58 S) and Port Nolloth (28.18 S) for the seven months, June to December, 1930. The figure for Durban is 19.7° C. and that for Port Nolloth, only about 40 miles north of the latitude of Durban, is 12.3° C. These figures were obtained from data supplied by Marchand (1932). The region between Cape Agulhas and Cape Point is subject to branches of the warm current and shows marked seasonal temperature fluctuations due to the south-east winds of summer. The temperature conditions of South African coastal waters are dealt with more fully by the writer in a separate paper (Isaac, 1937 i).

The warmer waters are poorer in phosphates and nitrates than the waters of the west coast, but are more saline. As compared with the colder waters the oxygen content will also be lower, although there are no figures available.

The Union coasts being situated in warm temperate latitudes, the seaweeds during inter-tidal exposure are exposed for much of the year to considerable heat and light and on the whole to little rainfall (Isaac, 1938).

#### AGAR-PRODUCING SEaweEDS.

Seaweeds are the normal source of agar, which has many uses. Agar is used to make jellies, candies, pastries, ice cream; as a thickener for soups, sauces, gravies; for the clarification of wine, beer and other liquids; as a sizing material; as a laxative and for surgical dressings. In Australia the greater part of the annual consumption of 70 tons is used for meat canning, and it is also used for the canning of fish. For many of these purposes substitutes can be found, although they may be less satisfactory and more expensive. There is, however, no adequate substitute for the use of agar for bacterial and fungal cultures, and the production of agar in the Union for this purpose is an urgent matter.

Japan manufactures the greater part of the world's supply of agar.



although it is also prepared in China, Ceylon and Malaysia. More recently it has been made in U.S.A. and Australia.

Agar is prepared from a number of species, including *Gelidium corneum* (Japan, North America), *G. cartilagineum* (North America), other species of *Gelidium*, *Gracilaria confervoides* (Ceylon, China, North America, Australia), other species of *Gracilaria*, *Eucheuma spinosum* (Java, Malaysia, North America, Australia), *Camphylaphora hypneoides* (Japan, North America). Also various *Gigartinaceae*.

It is considered that the best agar is obtained from *Gelidium corneum*. This species was listed for the Union by Barton (1893) and subsequently recorded by Tyson (Delf and Michell, 1921). The species has not again been recorded, although of recent years a number of people have studied various localities from Port Nolloth to Durban. The previous records possibly either referred to drift or were mistaken identifications. In any case the species can be regarded as rare and thus of no economic value.

Possible South African agar-producing species are dealt with below.

*Gelidium cartilagineum* (Fig. 1, 5). Although this species occurs on the west coast of the Cape Peninsula (Olifantsbosch, Oudekraal, Camps Bay) it is essentially a warm-water species. It is found at least as far east as Cape Morgan (Stephenson, 1939).

It is uncovered only at low water of spring tides. It occurs at the lowest levels of the inter-tidal region and extends into the sub-littoral. On the east coast of the Peninsula it may locally be dominant (vertical rock ledges) but it is more usually either a prominent species or sub-dominant or co-dominant. It is also found in rock pools.

Agar can be obtained from a number of species of *Gelidium* and according to Dr. F. W. Fox the widely distributed *G. pristoides* (Fig. 1, 1) is a good source of agar. *G. pristoides* has been found as far east as Cape Morgan (Stephenson, 1939). It is a characteristic seaweed of the south coast of the Union and also occurs along the West coast of the Cape Peninsula as far north as Kommetjie. It dominates a zone at mid-tide level. The upper parts of this zone are only sparsely covered by the alga but at its lower levels the plant becomes more abundant and there is also a considerable admixture of other species.

*Gracilaria confervoides* (Fig. 1, 4).—This is the main source of the agar made in Ceylon and China. There are also adequate supplies of this species in Australia (Anon. 1941) for the collecting of which a suitable harvester has been devised.

It cannot at present be said whether or not there is much of this plant in the Union, but the type of habitat in which it is likely to be



FIG. 1. 1. *Gelidium pristoides*  $\times \frac{1}{2}$ . 2. *Hypnea spicifera*  $\times \frac{1}{3}$ . 3. *Suhria vittata*  $\times \frac{1}{3}$ . 4. *Gracilaria confervoides*  $\times \frac{1}{3}$ . 5. *Gelidium cartilagineum*  $\times \frac{1}{3}$ . 6. *Porphyra capensis*  $\times \frac{1}{4}$ . (Del. F. M. Leighton.)

found has been surveyed to a much lesser extent than the coastal rocky habitats. It occurs in considerable quantity in the protected waters of the lagoon around Langebaan (Isaac, 1937, ii). Here it grows rooted in the sand and is permanently submerged. The plants although slender are long (maybe over six feet) and richly branched. In April, 1936, this alga was thrown up in such large amounts as to form an extensive bank a few feet across and three to four feet high from Langebaan northwards to the latitude of the open sea, a distance of about two miles. It also occurs in a protected part of Hout Bay. *Gracilaria confervoides* from Hout Bay is a rich source of agar. Agar obtained from this source has been successfully used by a sweet manufacturing firm in preliminary trials for the manufacture of certain types of sweets. An examination of similar localities along the south coast of the Union might yield other rich beds of this alga.

*Gigartina* spp.—Various species of Gigartinaceae also yield agar. There are a number of South African species of *Gigartina* of which two, *G. radula*<sup>1</sup> and *G. stiriata*, are both common and widely distributed. Of these, the latter species has already been shown by the Medical Research Institute, Johannesburg, to be useless as a source of agar (information contained in letter from Dr. F. W. Fox). *Gigartina radula* occurs towards the upper parts of the region between the low-water levels of spring and neap tides. It flourishes best in places protected from the full force of the sea and locally it is often abundant. It occurs from Port Nolloth to East London but mostly in the western part of this range.

Jellies obtained from certain edible seaweeds are sometimes used instead of agar (Moore 1941). Consequently, the jelly obtained from *Suhria vittata*, of which it is a very rich source (see under "Edible seaweeds"), may be used as agar.<sup>2</sup>

#### THE KELPS.

The word kelp was originally applied to the ash left after burning certain large brown seaweeds. Later, the word became transferred to the seaweeds themselves. These seaweeds are members of the Laminariales.

Kelps have been used as sources of potash and iodine; as fertilisers;

<sup>1</sup> This term is used for South African material may cover a number of species. Until further work is done on South African Gigartinas the name *G. radula* is retained. (See note: Isaac, 1937, ii, p. 126.)

<sup>2</sup> Tests carried out by Dr. F. W. Fox at the Medical Research Institute, Johannesburg, have shown that *Hypnea spicifera* (Fig. 1, 2) is also a good source of agar. This species although found on the West coast (Isaac, 1937, ii) is more frequently found near low water level of spring tides in warmer waters where it may be very abundant, as at East London.

as a source of alginic acid and also as food. During the last war not only was *Macrocystis pyrifera* a major source of potash to the United States, but it was also a source of acetone and acetic acid which were obtained from the distillation of the fermented seaweed. With the cessation of hostilities, however, operations were immediately suspended by the Hercules Powder Company (Tressler, 1923). Alginic acid and its salts, the alginates, find many uses. It has been used as a substitute for horn and as an insulating material; for making an inexpensive transparent wrapping; for sizing materials; for fixing mordants in fabrics and to a limited extent as a mordant; for resolving and preventing incrustation of boilers; and (ammonium aluminium alginate) for making waterproof fabrics.<sup>3</sup> A number of species of kelp are used as food by the Japanese but these products must be regarded as constituting low-grade food. The preparation of food products from kelps was—at least at one time—the most valuable seaweed industry of Japan (Smith, 1905). The fronds of the various seaweeds are treated in various ways and finally shredded, powdered, cut into pieces and compacted before putting on the market. These products are used as flavourings for soup and meats, with soybean sauce as a relish, as a vegetable and as a substitute for tea. Details can be found in Smith's paper (1905).

The chief possible emergency use of kelps in the Union would be as a source of potash and possibly also for alginic acid.

The kelps are essentially cold-water species and occur along the entire length of the west coast of the Union, becoming very abundant in certain localities (e.g. Slangkop, Melkbosch). The South African cold-water kelps are *Ecklonia maxima*, *Laminaria pallida* and *Macrocystis pyrifera* (Fig. 2).

The last-named species has the most limited distribution. It has been found on the coast as far north as Melkbosch and also around Dassen Island (Isaac, 1937, ii). It is found in calm or protected places and not infrequently within a palisade of other species. In this respect, as well as in its smaller size, it presents a contrast to the *Macrocystis pyrifera* found in the cold waters along the west coast of the Americas, from Tierra del Fuego to within a few degrees of the equator and along the extra-tropical west coast of North America to about 60° N. latitude (Setchell, 1935). Not only has it this wide distribution but it flourishes in rough seas and in places "it occurs in large beds, sometimes several miles in length and varying from fifty yards up to two or three miles in width". (Tressler, 1923, p. 91.) Twelve to nearly a hundred stipes

<sup>3</sup> For further uses, see Delf (1940).

may arise from the same base. The stipes are usually about 100 feet long and often much longer. A stipe length of 1,000 feet has been recorded (Tressler, 1923). No general statement can be made regarding the size of the South African plant but it can safely be said to be much smaller than the American plant. It is of interest to note that should

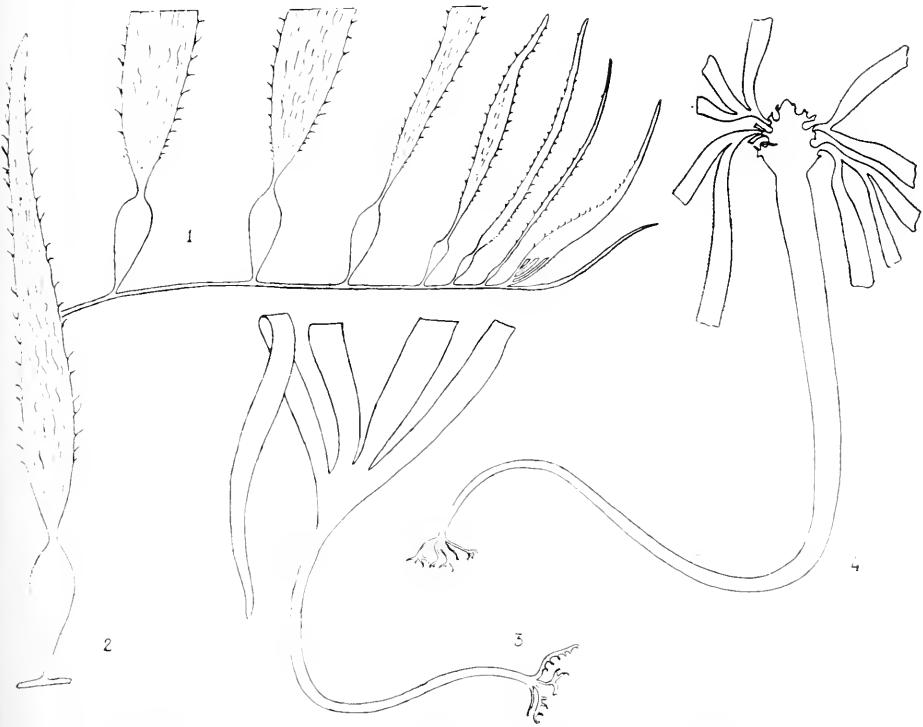


FIG. 2. 1. Terminal portion of frond of *Macrocyctis pyrifera*  $\times \frac{1}{3}$ . 2. *Macrocyctis pyrifera*: single leaf-like segment with basal float  $\times \frac{1}{3}$ . 3. *Laminaria pallida*  $\times \frac{1}{12}$ . 4. *Ecklonia maxima*  $\times \frac{1}{12}$ . (Del. F. M. Leighton.)

the South African plant prove to be a distinct species from the American plant it remains *Macrocyctis pyrifera* since it is the original species as described by Linnaeus (Papenfuss, 1940, ii).

*Laminaria pallida* is more definitely a cold-water species than *Ecklonia maxima*. It is a west-coast species which becomes more abundant with a decrease in sea temperature (Isaac, 1938), and at Port Nolloth

it would seem on the whole to be the dominant species (Stephenson, Stephenson and Day, 1940).<sup>4</sup>

*Ecklonia maxima*, until recently known as *E. buccinalis* (Papenfuss, 1940, ii), is the most widely distributed South African kelp and is popularly known as the sea trumpet or sea bamboo. In addition to occurring on the west coast it is also found along the southern part of the east coast of the Peninsula, in Sandown Bay (east of Cape Hangklip), at Hermanus and even in the region of Cape Agulhas.<sup>5</sup> In the last-named locality, however, it is definitely of local occurrence.

*Macrocystis* is of too limited a distribution in South Africa to be of itself of economic importance, but there is an abundant growth of the other two species and especially of *Ecklonia maxima*. Although these species do not compare with the giant kelps of the west coast of the Americas for size, they attain considerable dimensions in the colder waters. *Laminaria* commonly has a stipe length of 6-9 ft., while *Ecklonia* may frequently have a stipe length of 20 ft. or more. Maximal lengths are still more imposing but less significant.

In the warmer waters from Port Elizabeth to beyond East London smaller species of kelp are found. These are *Ecklonia Richardiana* and especially *E. exasperata* (Papenfuss, 1940, i). These species are too small in size and present in too small numbers to be of economic value as a source of potash.

#### EDIBLE SEAWEEDS.

The list of edible seaweeds is a very long one. They are mostly used as food in Hawaii, China and especially Japan. Certain seaweeds are also eaten in parts of Europe, including Britain, and in the United States of America. In South Africa *Suhria vittata* has long been used for making edible jelly to which are added various flavouring matters.

Not much work has been done on the availability to the body of the carbohydrates and proteins of seaweeds, but it would seem that the carbohydrates are resistant to digestion. With certain exceptions, notably *Porphyra* and *Ulva*, the protein content is low. Seaweeds are good sources of minerals, iodine, and, in some cases, of vitamins B and C. How the content of these vitamins is affected by the various methods of preparation and cooking has not been examined. Taken as a whole, however, seaweeds must be regarded as low-grade food. Various species of *Porphyra* (laver) are possible exceptions since they are rich in vitamins B (Norris, Simeon and Williams, 1937) and C and also

<sup>4</sup> The other Port Nolloth records cited are also contained in this paper.

<sup>5</sup> This list does not claim to be exhaustive but the localities named above are known to the writer.

in protein. The vitamin C content of *P. umbilicalis* has been reported as 140 mgms.-100 gms. wet tissue (Lunde and Lie, 1938), and values of 36 mgms. (*P. naiadum*) to 60 mgms. (*P. perforata*) per 100 gms. wet weight have been recorded by other workers (Norris, Simeon and Williams, 1937). A number of analyses of protein content are available and values for different species of 33 to 46 per cent. of the dry weight (re-calculated) have been given (Reed, 1907).

*Porphyra*, the South African laver, (Fig. 1, 6) is a very variable and widely-distributed seaweed occurring from Port Nolloth to East London. The various forms, however, all belong to one species, *Porphyra capensis*. It has a wide vertical range on the seashore but it is typically found high up on the shore where it is exposed to the air for longer periods than any of the other large seaweeds. On the west coast *Porphyra* forms a dense and well-developed zone, the individuals being of a large size, deep colour and densely massed. As the sea temperature rises the zone becomes less well developed and the individuals become smaller in size and paler in colour. Thus *Porphyra* becomes progressively rarer east of False Bay. In the warm waters of the East London district it is a relatively rare, pale and stunted plant, occurring in small and isolated tufts. It has not been recorded at Durban. On the west coast north of the Cape Peninsula, the species can be collected throughout the year and in many districts it occurs in great profusion (e.g. Kommetjie and Melkbosch). It shows seasonal fluctuation in the warmer waters.

*Porphyra*, regarded by many as a delicacy, is eaten in many parts of the world, including parts of Britain, France, China, Hawaii and especially Japan, where it is a valuable cultivated crop. It is prepared for the table in different ways in different parts of the world. Some British recipes will be found in Hill's *Wild Foods of Britain* (1941).

*Suhria vittata* (Fig. 1, 3) chiefly grows as an epiphyte on the stipes, or on limpets attached to the stipes, of kelps, especially on *Ecklonia maxima*. It is found less frequently at the base of the frond. It also grows on the rock or on limpets beyond low-water level of spring tides. Rarely it may be found attached to the rock in pools of the inter-tidal region. From its association with *Ecklonia* it will obviously be chiefly found on the west coast where it has been found as far north as Port Nolloth.

The seaweed is dried and bleached and then boiled until disintegrated and a jelly is formed. This is then strained and different substances (milk, salt, wine, sugar, lemon) added for flavouring.

*Ulva lactuca* is widely distributed, being found from Port Nolloth to Durban, although it may disappear during certain times of the year

or become completely or considerably bleached. It is most common (e.g. Melkbosch and Kommetjie) in rock pools but it may also be common in damp places on flat shelving rocks.

It is prepared similarly to *Porphyra* (Hill, 1941) but is regarded as inferior to the latter. *Ulva lactuca* is also rich in proteins (Reed, 1907) and in vitamins B and C (Norris, Simeon and Williams, 1937).

*Codium platylobium*, *C. fragile*, *Phyllitis fascia* and *Grateloupia filicina* are eaten in certain parts of the world. We have already referred to the use of kelps as food. *Codium platylobium* was formerly known as *C. Lindenbergii* (Papenfuss, 1940, i). It occurs on the south and east coasts although it is somewhat local in its distribution. *Phyllitis fascia* is a small seaweed found in warmer waters (St. James, East London, Durban) at the lower levels of the *Gelidium pristoides* zone. *Grateloupia filicina* is mostly found on the west coast but it also occurs on the east coast of the Cape Peninsula. It is chiefly found in rock pools. *Codium fragile* is essentially a cold-water species and has been found as far north as Port Nolloth. It also occurs on the east coast of the Cape Peninsula. The four species dealt with in this paragraph are not sufficiently common, except perhaps very locally, to be of economic value.

It may be mentioned that various species of *Enteromorpha* are eaten. Two of these species (*E. compressa* and *E. intestinalis*) occur on South African coasts, more typically in rock pools. It should be noted, however, that they frequently occur in foul water, e.g., in pools fouled by penguins on Dassen Island.

Seaweeds are used in many places as stock food. Except for species of *Desmarestia* some of which are very acid and others of which are reputed to be poisonous (Moore, 1941), none of the seaweeds are likely to be poisonous. Good results have been claimed for *Porphyra* sp. at the Auckland Zoological Park (Moore, 1941). Commercial preparations have been marketed, using *Macrocystis pyrifera* (American firm) and *Fucus vesiculosus* (Norwegian firm).

*Desmarestia* occurs in deeper water off the South African coast and is sometimes thrown up as drift.

#### SEAWEEDS AS FERTILISERS.

Seaweeds are used to fertilise the soil in coastal districts of America and Northern Europe. They are applied wet, after composting with or without farmyard manure or other refuse, after drying with or without grinding, or the ash of dried and burned seaweeds may be used. Moore (1941) suggests that a fertiliser of seaweed, fish offal and waste fish



might prove of value in New Zealand. If seaweed only is used it is necessary to supplement the nitrogen and especially the phosphate.

Many kinds of seaweed may be used and thus seaweed drift might be utilised. Not all seaweeds, however, are of equal value. Good sources of seaweed fertiliser are the kelps, the fucoids, *Ulva* spp. and *Rhodomenia palmata*.

The South African kelps have already been dealt with. The only large and common South African fucoids are *Bifurcariopsis capensis* (formerly *Pycnophycus laevigatus*), *Bifurcaria brassicaeformis* and species of *Sargassum*. *Bifurcariopsis* occurs low down in the littoral zone or in rock pools but except very locally it is not very common. It occurs on the coasts of the south-western corner of the Cape Province (chiefly in the warmer waters). *Bifurcaria brassicaeformis*, although of limited distribution, is very common on the east and west coasts of the Peninsula where it forms a dense growth at about low-water level of neap tides and on rocks exposed to constant spray out at sea. The plant has creeping rhizome-like organs which allow it to occupy the areas where it occurs to the practical exclusion of all else. *Sargassum* is found on the south and east coasts of the Union but it is probably not sufficiently common to be of use as a fertiliser which is also the case with *Ulva* spp.

For drawing the figures I am indebted to my wife.

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FULL CITATION OF SOUTH AFRICAN ALGAL SPECIES MENTIONED.

- Bifurcaria brassicaeformis* (Kütz.) Barton.
- Bifurcariopsis capensis* (Aresch.) comb. nov.
- Codium fragile* (Suring.) Hariot.
- C. platylobium* Aresch.
- Ecklonia exasperata* (Turn.) J. Ag.
- E. maxima* (Osbeck) Papenf.
- E. Richardiana* J. Ag.
- Enteromorpha compressa* Kütz.
- E. intestinalis* Link.
- Gelidium cartilagineum* (L.) Gaillon.
- G. pristoides* (Turn.) Kütz.
- Gigartina radula* Ag.
- G. stiriata* (Turn.) Aresch.
- Gracilaria confervoides* (L.) Grev.
- Grateloupia filicina* (Wulf.) C. Ag.
- Hypnea spicifera*, J. Ag.
- Laminaria pallida* Grev.
- Macrocystis pyriferia* (L.) C. Ag.
- Phyllitis fascia* Kütz.
- Porphyra capensis* Kütz.
- Suhria vittata* (L.) J. Ag.
- Ulva lactuca* Linn.

## SOME PENINSULA SPECIES OF *URGINEA*.

By R. S. ADAMSON.

The genus *Urginea* Steinh. (Ann. Sci. Nat. Bot. II. 2. 321, t. 14. 1834) was created for certain species which had previously been placed in *Scilla*, *Ornithogalum*, *Anthericum*, *Albuca*, or other genera. The type species is the N. African plant, *U. fugax* Steinh., which was figured, and from the locality of which the generic name was taken.

The genus is distinguished by the bulbous habit, equal and most often united perianth segments, and flattened seeds with a loose membranous testa. Other characters are the spurred bracts, white flowers with at least the midribs coloured externally, and the stamens attached to the perianth with the filaments little or not dilated. The sheath with raised transverse bars round the base of the peduncle is characteristic of many but not all the species.

Since its inception the number of species included in the genus has greatly increased and the connotation has been somewhat altered. A number of authors (e.g. Baker Fl. Cap. VI. 462. 1897; Krause Engl. & Prantl Die Nat. Pflanzenf. ed. 2. 15a. 340. 1930; etc.) have defined it as having free perianth segments. Indeed, Miss Duthie (Ann. Univ. Stel. 6A. 2. 5. 1928) created a subgenus, *Pseudurginea*, for the plants with a united perianth but otherwise inseparable from *Urginea*. In 1930 the related genus *Urgineopsis* Compton (Journ. Bot. 58. 107. 1930) was created for the single species *U. Salteri* Compton; this genus is distinguished from *Urginea* by the perianth with a distinct tube with the stamens inserted at its top, and the flat, winged seeds. From the related genus *Rhadamanthus* Salisb. it is separated by the not dilated stamens and by the dehiscence of the anthers. (Cf. Dyer in Hook. Icon. 33. t. 3247, 1934.)

Union of the perianth segments was mentioned in the original description (l.c.) and though often very slight, occurs in most of the species, e.g. *U. filifolia* (Jacq.) Steinh. Among the various species in the genus, all grades can be seen from an almost completely free perianth to one with a tube a third the length of the segments. All have the stamens united to the perianth; in those with almost free segments the insertion is at the base, in those with a greater degree of union it is higher up. Even the rather extreme case of *Urgineopsis Salteri* is matched exactly in *Urginea pygmaea* Duthie, and almost so in *U. Dregei* Baker and *U.*

*arenosa* which is described below. On the other hand, species which are allied in other features may have an almost free perianth, e.g. *U. minor* Duthie.

The presence or absence of a wing to the seed is not a diagnostic character: in all the testa is loose and may often project beyond the limits of the internal parts. *U. minor* Duthie has winged seeds just like those of *Urgineopsis*.

Examination of a number of species shows that the features that separate *Urgineopsis* from *Urginea* are matters of degree not kind, and that it is not possible to create two genera on any natural or constant features. The only satisfactory scheme is to unite the two when the single species becomes **Urginea Salteri** (Compton) Adamson.

In addition to this four species were recorded from the Peninsula by Bolus and Wolley-Dod (Trans. S. Af. Phil. Soc. XIV. 343. 1903). The number has now been increased to 13 of which one is only found just outside the strict boundaries. The additions are new records for the area and three species here described. The new records are:—

**U. pusilla** Baker. First found by Capt. T. M. Salter some year ago. It is a plant that flowers very intermittently and apparently only after fires. In cultivation no flowers have been formed.

**U. unifolia** Duthie. Occurs in several localities about Fish Hoek and Kommetje.

**U. Eckloni** Baker. Two separate and distinct species have been included under this name. The species was originally described (Engl. Bot. Jahrb. XV. Beibl. 35. 6. 1893) from a specimen in the Berlin Herbarium (Ecklon & Zeyher 128). The specimen is a flowering one with no leaves.

Recently Capt. Salter discovered an *Urginea* growing on ironstone flats under bushes near Pinelands, which agrees very closely with Baker's original description and which in the absence of any possibility of comparison with the type specimen may be identified with Baker's species. As the original description was short and not complete the following more extended one is given:—

Bulb ovoid, up to 3 cm. long, 1.5 cm. diam., with several pale, papery outer tunics, usually in groups in the surface soil or even not wholly buried. Leaves hysteranthous, 10—20, linear, erect, darkish green, 5—12 cm. long (in cultivation up to 16 cm.), completely withered before the flowers appear. Peduncles slender, 10—12 cm. long or occasionally up to 15 cm., purple, bearing a close almost capitate raceme of 4—10 flowers, the axis extending in the later stages. Pedicels up to 15 mm. long. Bracts 1.5—2 mm. long, triangular with a narrow point and a broad, blunt spur not exceeding the length of the bract. Perianth

segments almost free, with a broad purple stripe externally covered by minute appressed hairs, the tips incurved and minutely ciliate, not keeled. Stamens a little shorter than the perianth, the filaments slightly muricate in the lower half. Ovary ovate, narrowed upwards, longer than the straight style. Fruit round oval, up to 1 cm. long, 4—6 mm. diam. Seeds black, flat, 3 mm. long, 1·5 mm. wide, very slightly winged.

In Fl. Cap. (VI. 465. 1897) Baker described the ovary as “globose” but in the specimens it is about twice as long as wide. The flowers open about sunset for quite a short period.

Cape Peninsula: 'Ndabeni, *Salter* 8699 (fls.), 8599 (lvs., fls. in cult.); *Adamson* 3316.

In 1928 Miss Duthie (l.c. 6.) gave a full description of plants collected at Stellenbosch under the name *U. Eckloni*. This identification was made because specimens were sent to Berlin and reported upon as agreeing with the type specimen there.

Plants that agree exactly with Miss Duthie's description and specimens have been collected on the Peninsula recently. These are larger and stouter than the plant figured (l.c. t. V. f. 3—5). These plants are quite distinct from those described above and exhibit several marked divergencies from the original description of *U. Eckloni*. The main points of difference are:—

Bulb depressed and laterally compressed. Leaf 1, present with the flowers. Bracts with long spurs. Inflorescence umbellate with pedicels shorter than the flowers. Outer perianth segments keeled. Style longer than the ovary.

This plant flowers a month earlier than the other. It is a distinct species and requires a name. It is called after its discoverer **U. Duthieae** Adamson. nom. nov. (*U. Eckloni* Duthie Ann. Univ. Stell. VI. A2. 6. t. V. f. 3—5. 1928. non Baker).

The leaf commences to shrivel at the tip at flowering and occasionally dries up altogether.

Cape Peninsula: 'Ndabeni, *Salter* 8698; *Adamson* 3266, 3270.

**U. minor** Duthie. This distinctive species has been found at de Klip just beyond the boundary of the Peninsula area in some quantity but so far not within. The flowers open rather suddenly about 5 p.m.

**U. gracilis** Duthie. As a result of the examination of the type specimen (Duthie in Herb. Univ. Stell.) and many others, the separation of this species from *U. Dregei* Baker does not seem possible. The differences are in size. *U. gracilis* seems merely a state of drier and poorer soils.

The following species are new —

**U. arenosa** Adamson. Bulbus ovoideus, albus, in collum breve

productus, 2 cm. longus, 1 cm. diam., tunicis externis tenerrimis. Folia hysternantha, unica vel dua, erecta, teretia, tenuia, 4 cm. longa (in horto 8 cm.). Scapus erectus, 8—12 cm. altus, purpureus apice fuscus, floribus 8—20 dense racemosis. Pedicelli 1·5—2 mm. longi, patentes, bracteis calcare aequalongo duplo longiores. Perianthii segmenta 5—6 mm. longa, basi in tubum campanulatum 2—2·5 mm. longum connata, lobis patentibus marginibus revolutis. Stamina in apicem tubi inserta, lobis breviora. Fructus erectus, ovato-rotundatus, ruber vel castaneus, 5 mm. longus, 4 mm. diam. Semina nigra complanata pyriformia immarginata.

Upland sandy soils at 1,000—1,500 ft. Fl. Mar. after fires.

Cape Peninsula : Red Hill, *Salter* 8321 (type in Bolus Herb.) ; *Adamson* 2802, 2828, 2934 ; Steenberg Plateau, *Salter* 8347.

Bulbs solitary. Flowers orange-brown externally and much like those of *U. Salteri*. Quite distinct from that species in habitat, habit, leaf, seed and flowering time.

*U. exilis* Adamson. Bulbus parvus, pyriformis, 2 cm. longus, 1—1·5 cm. diam., in collum productus, tunicis externis submembranaceis tenerrimis, interioribus in vaginam scariosam productis. Folium unicum, hysternanthum, teres, 5 cm. longum. Scapus erectus, 4—6 cm. altus, floribus 1—3, raro 4, racemosis, erectis, breviter pedicellatis. Bractee parvae pedicellis breviores in calcarem perbrevev productae. Perianthii segmenta 3—5 mm. longa, externe alba medio purpurea, basi brevissime connata. Stamina perianthio paullo breviora. Fructus erectus, ellipsoideus, apice subobtusus, 5 mm. longus, 3 mm. diam. Semina nigra, acute angulata, immarginata.

In pockets on rocks where humus soil collects. Fl. Jan.-Feb.

Cape Peninsula : de Klip, *Salter* 8312 (type in Herb. Bolus) ; *Adamson* 2797, 2832 ; 'Ndabeni, *Salter* ; Signal Hill above Fresnaye, *Salter* 8315 ; N. side of Devil's Peak, *Adamson* 3142.

An inconspicuous species distinguished by the almost free perianth white except for the purple midrib, the blunt capsule, and angular seeds.

*U. flexuosa* Adamson. Bulbus albus, pyriformis, subcomplanatus, 2—2·5 cm. longus, 1·5—2 cm. diam., in collum 3 cm. longum productus, tunicis externis castaneis, tenerrimis, mox deciduis, aliis medio in-crassatis, apice elongatis, irregulariter distichis, interioribus in vaginam scariosam transverse vittatam purpuream productis.

Folia dua raro unica vel tria, semiteretia, superne plana, 28—30 cm. longa. Scapus erectus, superne flexuosus, basi purpureus apice fusco-viridis, 35—55 cm. altus. Racemus laxus, 1—2 cm. longus, floribus 3—8, patentibus. Pedicelli 5—7 mm. longi, bracteis purpureis calcaratis duplo longiores. Perianthii segments fere totius libera 10—12

mm. longa, alba externe purpurea. Stamina erecta coarctata antheris filaments aequilongis, subdeclinatis. Stylus declinatus, staminibus longior. Fructus ovatus, erectus. Semina plurima, nigra, complanata, 4 mm. longa, 2 mm. lata.

Humus soils damp in winter at low altitudes. Fl. Jan.-Feb.

Cape : Raapenberg, *Bolus* 4906 (as *U. exuviata*) ; Kenilworth Race Course, *Adamson* 2776 ; Constantiaberg, *Wolley-Dod* 752 (as *U. exuviata*) ; Klasjagers Farm, *Compton* 4701 (as *U. exuviata*) ; Smitswinkel Bay, *Adamson* 3099 (type in Herb. Bolus) ; Patrys Vlei, *Adamson* 2754 ; Cape Point, *Michell* (as *U. exuviata*).

Caledon : Grabouw, *Bolus*.

Leaves present with the flowers. The species is allied to *U. unifolia* Duthie but readily distinguished by the larger size, long neck to the bulb, 2 leaves, lax raceme, declinate stamens and style, and the time of flowering. In collections it has been labelled *U. exuviata* but is quite different from Jacquin's plate of that species (Ic. II. 18. t. 415. 1793). The flowers open at midday and usually 2 or more at a time.

The following key to the Peninsula species is given as a guide towards their identification.

1. Leaves present with the flowers.
  2. Perianth segments united for a third their length ; the free parts with reflexed edges : leaves fleshy : bulb watery :
    - small plant . . . . . *Salteri*.
  2. Perianth segments almost free, the free parts not reflexed : leaves not fleshy.
    3. Leaves 4 or more : bulb with papery outer tunics, the inner not thicker in the middle.
      4. Bulb ovoid : tunics not extending all round : leaves wiry. 4—6 . . . . . *filifolia*.
      4. Bulb globose : tunics wrapping right round : leaves soft. 3—4 . . . . . *exuviata*.
    3. Leaves 1 or 2 : bulb with thin outer tunic, the inner much thicker in the middle and more or less distichous.
      5. Leaves 2 : bulb with a long neck : flowers 1.5—2 cm. across . . . . . *flexuosa*.
      5. Leaf 1 : bulb without a long neck : flowers not over 1.5 cm. across.
        6. Bulb laterally compressed : flowers in a raceme . . . . . *unifolia*.
        6. Bulb depressed-globose, little compressed : flowers almost umbellate : perianth segments strongly keeled . . . . . *Duthieae*.
1. Leaves hysteranthous.
  7. Scape over 40 cm. high, spicate : leaves up to 5 cm. wide : bulb up to 8 cm. diam. . . . . *altissima*.

7. Scape not over 20 cm. high, not spicate : leaves narrow : bulb not over 3 cm. diam.
8. Leaves grass-like, flat : bulb pear-shaped with many papery tunics : flowers 1 cm. across . . . . . *pusilla.*
8. Leaves very narrow, more or less terete : flowers less than 1 cm. across.
9. Raceme 1 cm. long or more : leaf 1 or 2.
10. Flowers closely clustered all round the axis : perianth united below, the lobes with reflexed edges . . . . . *arenosa.*
10. Flowers rather distant and turning to one-side : perianth segments not with reflexed edges.
11. Scape 5—8 cm. high with 1—4 flowers : perianth segments almost free . . . . . *exilis.*
11. Scape up to 20 cm. high with many flowers : perianth segments united below . . . . . *Dregéi.*
9. Raceme with the flowers arising at or near the same level.
12. Scape not over 5 cm. high : flowers less than 5 mm. across : leaves 3—5, not over 5 cm. long : fruit subglobose . . . . . *minor.*
12. Scape over 10 cm. high : flowers 5—8 mm. across : fruit oblong : leaves 10—15 cm. long.
13. Leaves numerous : flowers with pedicels longer than the perianth . . . . . *Eckloni.*
13. Leaf 1 : flowers with pedicels shorter than the perianth . . . . . *Duthieae.*

In conclusion I have to express my indebtedness to Captain T. M. Salter to whom most of the new records are due, and who has assisted very greatly in the preparation of the key.



## BOOK REVIEWS.

- A. GUILLIERMOND. *The Cytoplasm of the Plant Cell*. Authorized translation from the unpublished French manuscript by L. R. ATKINSON. Waltham, Mass., The Chronica Botanica Co.; Johannesburg, Juta & Co., Ltd. 1941. x, 247 pp. Price, \$4.50.

During the first stages of its historical development, cytology was a static science, based chiefly on the description of fixed and stained preparations. To the critical mind it was always open to the question, a serious one, whether all the structures described were really natural structures or mere artifacts. Another reason for the inattractiveness of the older cytology to the average botanist was the abundance of rather confusing terms the significance of which was not always clear. Afterwards so much attention was paid to the nucleus that sometimes cytology is considered as practically identical with karyology.

In Guilliermond's excellent book, however, attention is focused on the cytoplasm and the modern dynamic viewpoint is stressed throughout. The result is that this book gives a thorough, critical and well-balanced survey of the various theories on cytoplasm, chondriosomes, plastids, vacuoles, etc., in which both the morphological and the functional (physico-chemical) point of view have been adequately stressed. Though the author, as one of the leading cytologists, has his own pronounced views, he always does justice to contrary views, so that a very high degree of objectivity in the treatment is obtained.

The following quotation from the foreword written by the American authority William Seifriz summarizes the main idea of the book: "Guilliermond concludes his book with the statement that the future of cytology lies in the union of morphology and physiology. In return for the admission by a morphologist that anatomy without physiology is sterile, let me say to Professor Guilliermond that physiology is meaningless unless supported by structure and function". It is this principle, followed as far as possible in the text, which makes the book so very attractive and stimulating to every botanist interested in the fundamental principles of his science.

W. J. LÜTJEHARMS.

ALAIN WHITE, R. ALLEN DYER and BOYD L. SLOANE. *The Succulent Euphorbieae (Southern Africa)*. Pasadena, Abbey Garden Press, 1941. Two volumes, xviii + 992 + 14 pp. 1102 figs. 25 coloured plates.

Mr. White and Mr. Sloane who were the authors of the splendid work on "Stapelieae", published in 1937, have now followed up that achievement with an equally fine book on the succulent Euphorbieae of Southern Africa. In this they had as co-author in the Union Dr. R. A. Dyer of the Division of Botany and Plant Pathology, who is personally responsible for much of the text and a large number of excellent photographs.

The new work follows on much the same lines as its predecessor. 193 species of Euphorbia are described, these being the succulent members of this vast genus indigenous south of the Cunene and Zambesi. While this is only about one-tenth of the total number of species which exist, it includes nearly all the ones which are of interest to amateurs and collectors of succulents, whose point of view is studied throughout the book. From the South African standpoint, the majority of the Euphorbias being succulent, this book is an almost complete regional monograph of the genus, and only needs to be supplemented in the case of the few herbaceous and shrubby species.

Each species is fully described in English: the area of distribution is given; synonyms are quoted: a commentary is added, dealing with history, variation, popular names, and special features of interest: and the whole is accompanied by numerous photographs and drawings. The work is on a lavish scale: for instance, *E. ingens* alone occupies 16 pages, including 19 photographs, mostly of plants in their natural habitat. Some of the less-known species naturally occupy less space. The authors have endeavoured to synthesise all that is known or has been written on the subject: many problems of identity and synonymy are left unsolved but the way is clearly pointed to future investigation.

Biographical and historical notes, with portraits, are full and interesting. They date back to King Juba II of Mauretania (who died in A.D. 18) who described the first succulent Euphorbia, and, astonished by its fleshy character as well as its medicinal properties, named it after his portly physician Euphorbus (whose name means well-fed). The systematic study and gradual advance in knowledge of the genus is described and there is a useful bibliography.

Botanists and students, especially in S. Africa, owe grateful thanks to White, Dyer and Sloane for this indispensable book which so worthily deals with one of the most remarkable and distinctive of our indigenous genera.

R. H. C.

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PLANTAE NOVAE AFRICANAE.

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SERIES XVIII.

By

MISS W. F. BARKER, PROFESSOR R. H. COMPTON, MR. S. GARSIDE,  
MRS. M. R. LEVYNS, PAYMASTER-CAPTAIN T. M. SALTER and  
MR. G. G. SMITH.

**Haworthia wittebergensis** Barker. (Liliaceae—Aloineae.) § Loratae.

*Caulis* simplex, long. 1—2 cm., diam. 1 cm. *Folia* multifaria, 9—multa, viridia vel fusco-purpurea, anguste lanceolata, longe attenuata, acuta, erecta vel parum curvata, coriacea, plana vel parum supra canaliculata, infra distincte carinata, base 2- vel 3-costata: margines, carinae pars superior dentibus plurimis parvis albis, carinae pars inferior costaeque tuberculis paucis indutis. *Pedunculus* simplex, angustissimus, clongatus, flexuosus. *Inflorescentia* laxa, floribus paucis. *Perianthium* bilabiatum, long. ad 15 mm.

*Hab.* Cape Province: Laingsburg Div.; collected in rock fissures on northern face of Witteberg, about 4,000 ft. alt., by Lewis Pieterse. Grown and flowered by him in Karoo Garden Whitehill, in flower March, 1942, (*type* in Nat. Bot. Gdns. Herb.).

*Description.*—Stem simple, 1—2 cm. long, 1 cm. diam., upper third covered with the bases of leaves, lower third with remnants of old roots; new roots develop in the centre and appear to have a contractile function. *Leaves* multifarious 9—many, narrowly lanceolate, attenuate, acute, erect or all slightly curved to one side, coriaceous, in the wild state dark purplish green but in cultivation tending to become green, up to 10 cm. long and 14 mm. broad at the base, flat or slightly channelled down the face

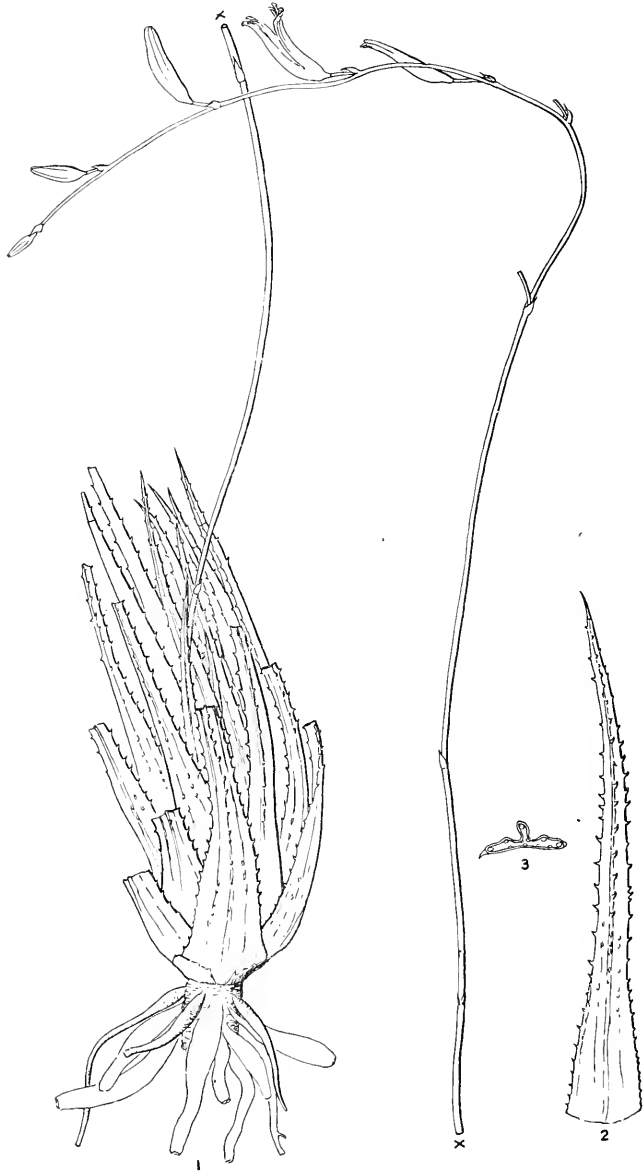


FIG. 1. *Haworthia wittebergensis*, Barker. 1. Plant, natural size. (Inflorescence drawn from dried material.) 2. Young leaf, back view, natural size. 3. Transverse section of young leaf taken at the centre  $\times 1\frac{1}{2}$ . (Lewis Pieterse.) Del. W. F. Barker.

and distinctly keeled with several longitudinal ribs near the base, margins with numerous small white teeth along their entire length. The keel is also toothed in the upper part, but near its base and on the ribs the teeth are reduced to small white tubercles or spots. The tips of the leaves even in the very young state tend to dry up and fall off in sections; thus the leaves become shorter with age, so that the outer leaves are invariably truncate and have the appearance of having been grazed by animals and only the very young leaves are intact. *Peduncle* simple, very slender, long and flexuous, up to 42 cm. long: flowers few, lax. *Perianth* curved, bilabiate, white with dull purplish veins, up to 15 mm. long.

The plant is very inconspicuous owing to its dull colour and its concealment in rock crevices, usually with only the broken leaf tips showing. It seldom branches and propagation must be almost entirely by seed. It is only known to occur on the Witteberg and has been collected there several times, though usually only in ones and twos. Owing to the absence of flowers, the genus to which it belongs was in doubt for several years after its first discovery, but in 1941 L. Pieterse, a coloured man employed in the Karoo Garden, Whitehill, obtained about twenty plants. Cultivation is difficult but Pieterse has grown the majority of his gathering successfully at the Karoo Garden, Whitehill and many plants have produced new leaves and roots. In March, 1942, a few bore single inflorescences, when the identity of the plant as an *Haworthia* was finally established.

Because of its coriaceous leaves which are similar in texture to those of *H. Blackburniae* Barker and *H. graminifolia* Smith it might seem natural to associate it with them in the § Fusiformae. Its roots however are not distinctly fusiform and I therefore place it in the § Loratae.

***Haworthia graminifolia*** G. G. Smith. (Liliaceae—Aloineae.)

§ Fusiformae.

Radices fusiformes, diam. usque ad 12 mm., longitudine circiter 8 cm. Caulis simplex, longitudine usque ad 4 cm., diam. circiter 10 mm. Folia angusta-linearia, longa 45 cm., basim versus lata 2 mm., facie laeva; subtus quatuor vel quinque lineis prominentibus concoloribus, in quibus tubercula oblonga, albida; marginibus minutissime denticulatis. Pedunculus simplex una cum racemo longus 43 cm., diam.  $1\frac{1}{2}$  mm.

*Roots* fusiform, up to 12 mm. diam., about 8 cm. long. *Stem* simple, up to 4 cm. long, about 10 mm. diam., covered with dry remains of old leaf bases. *Leaves* up to 14 in fully developed plants, narrow linear, subulate, erect when young, spreading when old, firm, about 45 cm.

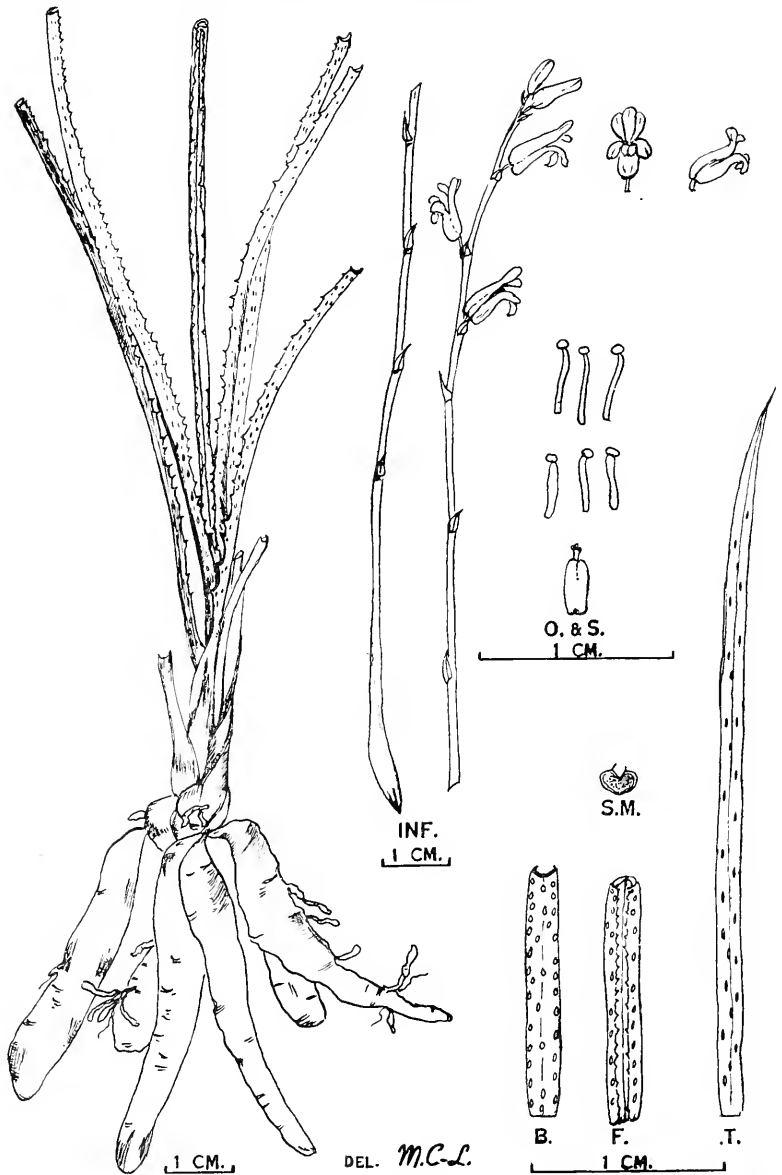


FIG. 2. *Haworthia graminifolia* G. G. Smith. O and S, ovary and stamens. Inf., inflorescence. B, back of leaf. F, face of leaf. T, tip of leaf. S.M. section near middle of leaf. (G. G. Smith 5222.) Del. Miss M. Courtenay-Latimer.

long (often 35 cm. long with an additional 10 cm. of the upper end dry), much dilated at the base, 2 mm. broad above base,  $1\frac{1}{2}$  mm. broad at the middle; *face* broadly "V"-shaped in cross section, smooth, dull green; *back* rounded and with 4—5 raised concolorous lines becoming less distinct upwards and on which occur small longitudinally oblong whitish tubercles, a few of which are minutely toothed, the tubercles irregularly disposed about  $\frac{1}{2}$  mm. distant along the lines but becoming less numerous and absent in the upper part, those on the middle line or keel continuing a little further, dark dull green; *margins* somewhat acute, minutely toothed, the white deltoid acute-acuminate straight, forward or backward bent teeth irregularly placed about  $\frac{1}{2}$  mm. apart and becoming very minute then tubercle-like upwards; *peduncle* simple,  $1\frac{1}{2}$  mm. diam. towards the base, including the raceme 43 cm. long, light green; *raceme* few-flowered (5—8), about 5 cm. long, with 2—3 flowers open at a time; *pedicels* 4 mm. long,  $\frac{1}{2}$  mm. diam.; *sterile bracts* about 9; *fertile bracts*  $2\frac{1}{2}$  mm. long; *perianth* white, about 13 mm. long, roundly trigonous, the shortly stipitate base 3 mm. diam., tapering to 2 mm. diam. near the throat, slightly compressed laterally, the 3 upper segments obtuse, slightly recurved and equal in length, the 3 lower segments very recurved and equal in length with the 2 outer ones replicate and spreading sideways; *stamens*  $2\frac{1}{2}$ — $3\frac{1}{2}$  mm. long; *ovary*  $2\frac{1}{2}$  mm. long,  $1\frac{3}{4}$  mm. diam., green; *style* 1 mm. long, straight; *capsule* 8 mm. long, 3 mm. diam.

*Hab.* Cape Province. Oudtshoorn Division: near Oudtshoorn, Courtenay-Latimer (Type, G. G. Smith 5222). *Distribution*: not further known.

This very distinct species is described from plants collected by Miss M. Courtenay-Latimer, Curator of the East London Museum, near Oudtshoorn. The brief description of the inflorescence is from drawings made by her shortly after the plants were found. In old plants the stem extends deeper into the ground and the roots then arrange themselves in 2 or 3 horizontal planes.

Miss Courtenay-Latimer records that the plants occur sparingly on mountain slopes facing south-west and amongst tall coarse grass, making it very difficult to find the plants even when in flower.

The discovery of this interesting plant a few miles north of Oudtshoorn was almost as sensational as that of *H. Blackburniae* Barker from some 40 miles west of this town, and now forms a second species to the *Fusiformae* Section. The most striking character, and one by which the plant is easily recognised, is the long, very narrow grass-like leaves.

**Spiloxene canaliculata** Garside. (Hypoxidaceae.)

*Spiloxene capensi* (L.) Garside similis sed foliis exterioribus siue

nervo medio et perianthii segmentis aurantiacis et basi purpureis et non iridescentibus : seminibus arcuatis.

*Hab.* Wet places on sand flats and ditch banks. Fl. July—Nov. Malmesbury Div., roadside between Darling and Yzerfontein, Sep. 18, 1932, *Garside* 4211 (Type, in Herb. Bolus) ; River bank near Groot Post Farm, Darling, Aug. 26, 1937, *Garside* 4841 and 4842 ; near Mamre Road Station, Aug. 15, 1939, *Garside* 4950 ; Yzerfontein, *Compton* 7469 (National Botanic Gardens Herbarium) ; Malmesbury Road, near Cape Town, Aug. 1939, *Salter* 3547 ; Berg Vliet Farm, Cape Peninsula, *Purcell* 162 (in Herb. S. African Museum, 52052).

*Description.*—Plants up to 35 cms. high, corms up to 2 cms. diameter, with black corm fibres terminating in a ring of short bristles surrounding the leaf-bases, and usually with the persistent remains of five or six old corms. *Leaves* about five, often strongly recurved, tough or subcoriaceous, canaliculate, the outer leaves U-shaped in section, and without a mid-rib (Fig. 2), linear-lanceolate, much attenuated and often flexuous in the distal third, a character which becomes more marked on drying, the leaf-margins with or without fine teeth and often somewhat infolded towards the leaf apex. *Peduncle* hollow, one-flowered, as long as or slightly longer than the leaves, and bearing a single green foliaceous bract (up to 11 cm. long) at the node. *Flowers* up to 10 cm. diameter. *Petals* lanceolate, orange coloured (Ridgeway, *Colour Standards*, 1912, Pl. III, 17, and Maerz and Paul, *Dictionary of Colour*, 1930, Pl. 9, L8), each with a deep purple glaucous and non-iridescent base (Ridgeway, Pl. XIII, 1k, and Maerz and Paul, Pl. 6, K4). *Stamens* orange-yellow, about as long as the three elongated yellow connate stigmas. *Style* very short. *Ovary* up to 3 cms. long, clavate and three-angled, ovules very numerous and in several rows on the axile placentae. *Fruit* capsular with persistent perianth and circumscissile dehiscence. *Seeds* very numerous, black, cylindrical-arcuate or J-shaped with indurated persistent thick funiculus near to the conical obtuse micropyle, which is sunk in a crateriform depression at the truncated end of the seed, testa closely and minutely tuberculate (Fig. 6.1).

This species bears such a close resemblance to *S. capensis* (L.) Garside that it has in the past always been mistaken for it, and occasional specimens of the new species occur in herbaria under the name *Hypoxis stellata* (Thunb.) Linn. fil. It is almost certain that the orange-coloured variety of *Fabricia stellata* Thunb. in J. C. Fabricius, *Reis. Norweg.* (1779), p. 29, described as " *Petalis aurantiacis* " is this new species, because a prolonged investigation of all the colour varieties of *S. capensis* has not so far revealed any with orange-coloured petals. *S. canaliculata* differs from *S. capensis* in having the outer leaves U-shaped in section



throughout their length (Fig. 6.2): those of *S. capensis* are V-shaped in section, or carinate, having a well marked mid-rib projecting from the lower surface (Fig. 6.3), a feature which is best observed in the distal portion of the leaf. In addition, the bands of sclerenchyma which accompany the vascular bundles of the leaf are much thicker and more prominent in *S. canaliculata* than in *S. capensis*, giving the leaf a tougher and more coriaceous texture. The shape of the seed distinguishes the new species at once, as it is unique in the genus, the other species having globose or ovoid seeds, as e.g. *S. capensis* (Fig. 6.4).

In all specimens of *S. canaliculata* so far examined, the purple-brown spot at the base of each petal has always been present. There is some

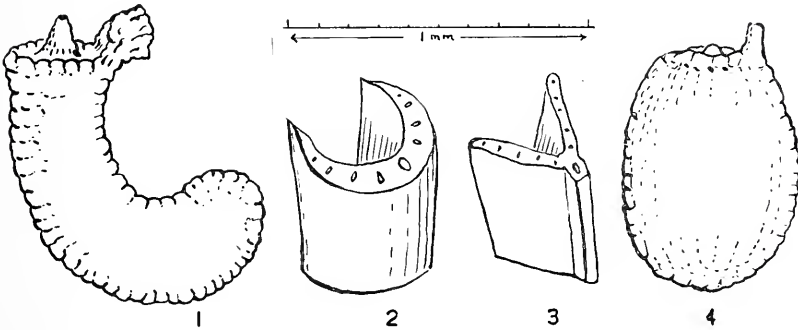


FIG. 3. 1. Seed of *Spiloxene canaliculata*. 2. Portion of leaf of *S. canaliculata*. 3. Portion of leaf of *S. capensis*. 4. Seed of *S. capensis*. (The scale refers to the seeds only, 1 and 4.)

variation in flower colour however. The type specimens were all orange-coloured, as already described, but in some localities, both orange and yellow-flowered plants were found growing together, e.g. *Garside* 4842 and 4950. The yellow-flowered plants (colour, *Ridgeway*, IV, 21b and *Maerz and Paul*, 9, K3), can always be distinguished by the leaf and seed from *S. capensis*. The present writer has not given varietal names to these colour forms, pending a consideration of variation in the genus as a whole.

Although *S. canaliculata* is frequent and widely distributed in the Swartland, where it grows in wet places and marshes, it has only been recorded from one locality in the Cape Peninsula, at *Berg Vliet Farm* (*Purcell*, 162). *Purcell* considered it (in MS., S.A. Museum) to be a new variety of *Hypoxis stellata*, a species which is abundant in this district.

He also observed and collected some plants which he considered as additional varieties, but which are more probably hybrids between *S. canaliculata* and *S. capensis*.

These hybrids have not so far been rediscovered, either at Berg Vliet or elsewhere, and an examination of fresh material will be necessary before their hybrid nature can be established with certainty.

It might be expected that similar hybrids would be common in the Swartland, but *S. capensis* is extremely rare in the area of distribution of *S. canaliculata* and opportunities for hybridisation therefore do not commonly occur.

**Eriospermum herporrhizum** Salter. (Liliaceae—Asphodeleae.)

*Planta* hysterantha. *Tuber* plus minusve obconicum, 2—4 cm. longum, carne alba, stolonibus tuberosis elongatis gracilibus, ad 16 cm. longis, accrescens. *Folium* subprostratum, late cordatum, 3—4 cm. longum, plerumque glabrum, basi petiolare ad 4 cm. longa, laterale, sed non in canaliculo adscendente. *Pedunculus* 30—35 cm. longus, 3—9-florus: racemus laxis: pedicelli inferiores fere 1 cm. longi, superiores gradatim breviores. *Perianthium* urceolato-campanulatum, 5—6 mm. longum, segmentis basi breve connatis. *Filamenta* basi connata, parte libera ovato-lanceolata.

Hysteranthous. *Tuber* usually horizontal, more or less obconical, 2—4 cm. long, with whitish flesh, increasing vegetatively by means of 1—4 elongate slender horizontal pale tuberous underground stolons or runners up to 16 cm. long, which swell clavately at the tips and finally produce new and independent tubers. *Leaf* appearing in July, solitary subprostrate, broadly cordate or cordate-orbicular, dark green, smooth, sometimes slightly undulate at the margins towards the base, 3—4 cm. long, 2—5 cm. broad, usually convex, the margins depressed, entirely glabrous or rarely minutely ciliate: petiolar leaf-base 3—4 cm. long, arising from a lateral growing point at the broad end of the tuber, but not ascending in a groove, emerging about 1 cm. above ground. *Peduncle* appearing Mch.—Apl., 30—35 cm. long, slender: raceme lax, 3—4 cm. long, 3—9-flowered: pedicels upcurved, the lowest about 1 cm. long, the upper progressively shorter: bracts small. *Perianth* urceolate-campanulate, 5—6 mm. long, the segments shortly sympetalous, dull white, with a brownish keel suffused with minute red streaks, the three outer elliptic-oblong, acute, somewhat spreading, the three inner sub-cuneate, pinched in at the apex, erect. *Stamens* about half as long as the perianth: filaments connate at the base, the free part ovate-lanceolate, slightly attenuate. *Ovary* sub-globose, about 2 mm. long: style 1.3 mm. long.

*Hab.* Cape Province: Malmesbury Div.; sandy flats south of Mamre, *Salter* 8236 (*type* in Bolus Herbarium); near Mamre Road

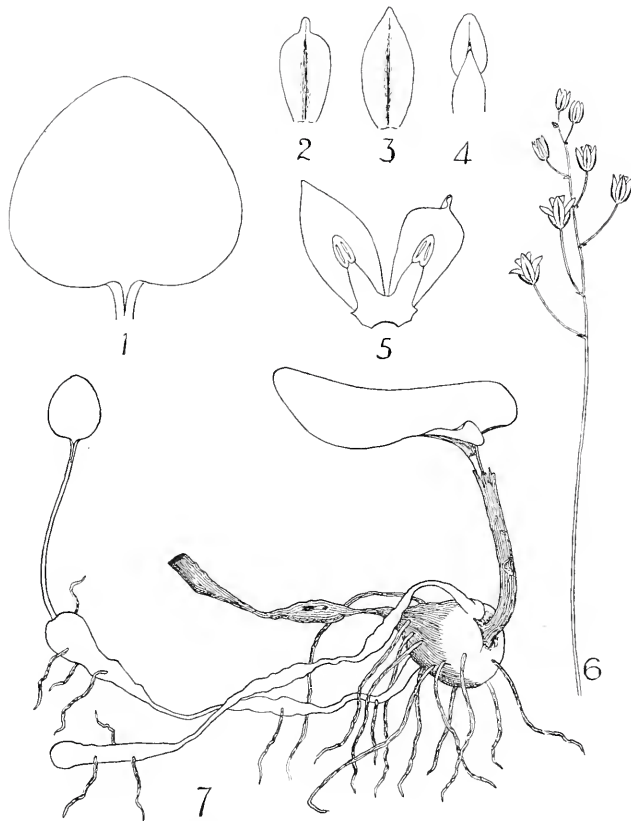


FIG. 4. *Eriospermum herporrhizum* Salter. 1. Leaf, flattened, natural size. 2 and 3. Inner and outer perianth segments, outer face  $\times 3$ . 4. Stamen  $\times 8$ . 5. An outer and inner perianth segment, inner face, showing stamens  $\times 4$ . 6. Inflorescence, natural size (Apl.). 7. Tuber and leaf, natural size (Aug.). (*Salter* 8236 (cult.)) *Del.* T. M. Salter.

Railway Station, *Salter* 8237; between Darling and Yserfontein, *Salter* 2415. All cultivated from plants gathered in leaf.

This sand-loving species is an affinity of *E. stoloniferum* Marloth, but is much smaller in every respect, the leaf being half the size and

usually entirely glabrous and the filaments are much narrower in proportion: also the tuberous stolons are longer and much more slender and the leaf-base does not ascend in a groove in the tuber. The plant has a general resemblance to the smaller, hill-side form of *E. nanum* Marloth, in which, however, the tuber is always simple and the filaments linear.

It is probably represented by other more or less imperfect or incomplete wild specimens in South African herbaria, some of which appear to have produced runners from the tubers, but they cannot be cited with any certainty. The genus is one which requires special study, for preference in cultivation, and drawings must be made of the tubers, which, in the dried state, shrink and generally become unrecognizable.

***Oxalis Burtoniae*** Salter. (Oxalidaceae.)

*O. polyphyllae* varietatibus multifoliolatis accedit, sed ita differt: *Bulbus* minor, globoso-ovoideus, tunicis atrioribus. *Rhizoma* in parte superiore rubescens. *Caulis* basin versus rubescens. *Foliola* 7, rarius 5—6. *Sepala* angustiora, leviter attenuata. *Corolla* laete flava, tubo angustiore: petali lamina ungui angusto subaequalis.

Slender, erect, 6—17 cm. high, finely and sparsely pubescent, the stem exserted. *Bulb* globosc-ovoid, acute at the apex, slightly attenuate towards the base, about 1.5 cm. long, blackish-brown. *Rhizome* very slender, 20 cm. or more long, rubescent towards the point of emergence, the scales small. *Stem* 1—9 cm. long, rubescent towards the base, green above, with 1—2 scales. *Leaves* about 6—8, apically congested: petioles filiform, for the most part 3—5 cm. long: leaflets 7, more rarely 5—6, shortly petiolulate, linear, conduplicate, minutely emarginate, 1.5—2.5 cm. long, 1—2 mm. broad, glabrous above, with 2 small apical calli. *Peduncle* 1-flowered, 3—8 cm. long, rubescent, with 2 small alternate bracts near the apex. *Sepals* narrow-lanceolate, reddish, about 7 mm. long, ciliate especially on the lower half, with 2 small orange-red apical calli. *Corolla* 2.5—3 cm. long, yellow, with a narrow tube: laminae of the petals broadly obovate, minutely pubescent near the margin, about as long as the narrow claw. *Filaments* (connate part included) the shorter 3—3.5 mm., the longer 4.5—7 mm. long, glabrous or sparsely glandular-pilose, with short teeth. *Ovary* pubescent on the upper half, the chambers 3-ovuled: styles pubescent below, glandular above.

*Hab.* Cape Province: Malmesbury Div., Langebaan, *Burton and Leipoldt*, in Bolus Herbarium 22615 (Type). Fl. June.

An affinity of *O. polyphylla* Jacq. and its multifoliolate varieties, but differs in having a smaller, differently-shaped bulb, narrower, slightly attenuate and more acute sepals, a yellow corolla with a very narrowly

funnel-shaped or almost cylindrical tube, the claw of the petal being proportionately longer and narrower, and in the marked reddening of the lower part of the stem, the colour extending underground to the upper part of the rhizome.

This plant, which has also been observed at Paternoster on kopjes

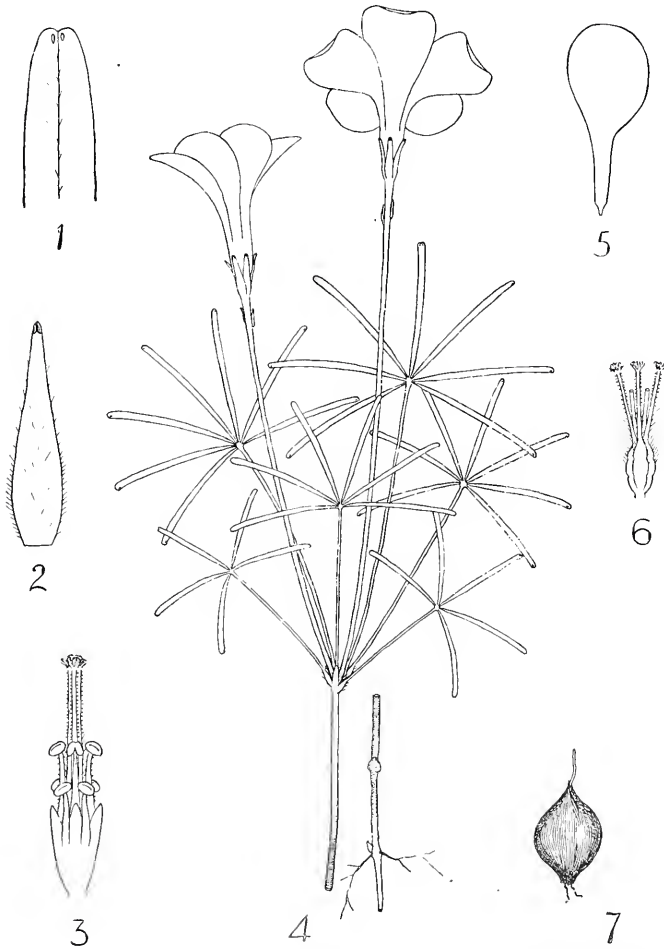


FIG. 5. *Oxalis Burtoniae* Salter. 1. Apex of leaflet  $\times 5$ . 2. Sepal  $\times 5$ . 3. Androecium  $\times 5$ . 4. Plant, natural size. 5. Petal, natural size. 6. Gynaecium  $\times 5$ . 7. Bulb, natural size. (B.H. 22615.) Del. T. M. Salter.

near the sea, has been named in honour of Mrs. H. Burton, one of the collectors.

As the genus is at present subdivided it falls into the § Multifoliolatae R. Knuth, whereas it is actually closely related to a species in § Tripartitae (Angustatae—Lineares), a good example of the complete artificiality of many of the existing named Sections.

**Priestleya glauca** Salter. (Leguminosae—Papilionatae) § Anisothea.

*Fruticulus* erectus, ad 60 cm. altus. *Folia* glauca, dense sericea, ea plantarum juniorum oblongo-lanceolata, ad 3·5 cm. longa, ea seniorum gradatim breviora, ovato-lanceolata. *Flores* axillares, pallide lutei, inconspicui. *Calyx* 0·8—1 cm. longus: lobi subulati, 2 superiores vix semiadnati, inferior longior et latior. *Vexilli* lamina oblongo-elliptica, emarginata. *Ovarium* dense sericeum, 2-ovulatum.

An erect shrublet, up to 60 cm. high. *Stem* woody, rigid, up to 1 cm. diam. at the base: secondary branches divaricate, with prominent leaf scars, glabrescent: branchlets silky-villose. Young plants congested in habit. *Leaves* closely congested, particularly in the young plants, erecto-patent, sessile, glaucous, acute, mucronate, somewhat revolute, closely silky-pubescent on both faces, ciliate with long lax hairs, the medial nerve prominent below, in the younger plants oblong-lanceolate, 2·5—3·5 cm. long, 5—6 mm. broad, in the older progressively shorter, ovate-lanceolate, 1·1—1·3 cm. long, 4·5—5·5 mm. broad. *Flowers* axillary in congested tufts towards the apex of the branchlets, palish yellow. *Peduncles* 1 mm. long or less, with 1 linear curved silky-villose bractcole 4—7 mm. long. *Calyx* 0·8—1 cm. long, silky-villose, obconic at the base, the tube campanulate: teeth subulate, 2—3 times as long as the tube, somewhat unequal, the 2 upper connate for nearly half their length, nearly as long as the 2 lateral, the lowest longest and widest. *Petals* glabrous: vexillum 8—10 mm. long, the blade oblong-elliptical, emarginate, slightly spurred at the base, subconduplicate, 3—4 times as long as the claw, the medial nerve thickened: alae oblong, slightly constricted at the middle, as long as the vexillum: carina 7—8 mm. long, erect or scarcely arched, obtuse, with short basal spurs. *Ovary* 2 mm. long, densely silky with long weak white hairs, 2-ovuled: style pilose on the lower part, glabrous above. *Legume* subturgid, more or less oval, obliquely attenuate at the apex, villose.

*Hab.* Cape Province: Cape Div., on lower north slopes of Hercules' Pillar (Justenberg), *Pillans* 6264 (*type* in Bolus Herbarium, *co-type* at Kew), *Salter* 8672: slopes above Camp's Bay, about 600 ft., *Levyms* 7567: Stellenbosch Div., "At Hottentot Holland Station" (near the present homestead Vergelegen) *Burchell* 8283, *Compton* 6410: Gordon's

Bay, *Bolus* (B.H. 22646) in fruit: Caledon Div., between Bot River and Boontjes Kraal, *Hutchinson* 319. Fl. Aug.

An affinity of *P. Guthriei* L. Bolus, differing in its glaucous leaves and narrower vexillum, but principally in the calyx, the two upper teeth being connate for rather less than half their length and much shorter than the lowest, whereas in *P. Guthriei* the two upper are connate nearly to the apex and rather longer than the lowest.



FIG. 6. *Priestleya glauca* Salter. 1. Flowering branch of a young plant, natural size. 2. Flower  $\times 3$ . 3. Calyx  $\times 3$ . 4. Ala  $\times 3$ . 5. Vexillum  $\times 3$ . 6. Carina  $\times 3$ . 7. Androecium  $\times 3$ . 8. Gynaecium  $\times 3$ . 9. Legume  $\times 1\frac{1}{2}$ . Del. M. Walgate.

The progressive transition in the shape and size of the leaves (from oblong-lanceolate to ovate-lanceolate) as the plant grows older is a marked feature of this species and the densely tufted young plants are very different in appearance from the straggling mature bushes. It has recently been discovered in the Cape Peninsula by Dr. M. Levyns on (as was thought) the thoroughly botanised slopes above Camp's Bay, where, though it is very local, 50 to 60 youngish plants were observed. It appears to be a slow-growing plant and it probably never or rarely

reaches full maturity in this locality on account of bush fires. The flowers are half hidden by the leaves and rather inconspicuous and its flowering period is extremely short. When not in flower it may easily be mistaken for young plants of *Lobostemon fruticosus* Buek, to which it bears a strong superficial resemblance.

I am indebted to Professor R. H. Compton for the identification of Burchell's specimen at Kew.

**Serruria inconspicua** L. Guthrie & Salter. (Proteaceae—Proteeae.)

*Fruticulus* late diffusus, 20—40 cm. altus, e basi ramosus: ramuli subdivaricati. *Folia* fere ad basin bipinnata, valde incurvata, oblique curvata, segmentis falcatis, ultimis ad 3 cm. longis. *Inflorescentiae* capitulis 1—5 confertis, 3—7-floris, foliis superioribus omnino caveatae. *Perianthium* album, adpresse cano-pubescent, fere 5 mm. longum, tubo 1.5 mm. longo. *Stylus* 3 mm. longus.

A widely diffuse shrublet, 20—40 cm. high, branching from the base, the branches glabrous, weak, flexuous, spreading, the lower subdecumbent: branchlets somewhat divaricate, more or less villous. *Leaves* bipinnate from near the base, more or less villous, up to about 5 cm. long and broad, subcucullate, intricate in the upper part, the rachis falcately and laterally oblique, somewhat incurved, the segments falcate, incurved, the ultimate filiform, 1—3 cm. long, acutely mucronate. *Inflorescences* few, terminal, inconspicuous, much hidden and enclosed by the leaves, sometimes on short or abortive branchlets low down on the branches. *Peduncles* short, solitary, or sparsely and shortly branched, up to 1 cm. long, pubescent, with long weak hairs admixed: bracts small, subulate. *Flower heads* 1—5, rather closely clustered, 3—7-flowered, about 5 mm. in diam.: floral bracts 6—7 mm. long, villosopubescent, narrowly ovate at the base with a long acuminate tip. *Perianth* white, straight in the bud, adpressed cano-pubescent, about 5 mm. long: tube about 1.5 mm. long: segments very slender, the limb ovate, 1 mm. long. *Anthers* 0.6 mm. long. *Ovary* puberulous: style glabrous, 3 mm. long, the thickened pollen-presenter 0.5 mm. long: stigma minutc. *Fruit* oblong, shortly hirsute, 4—4.5 mm. long.

*Hab.* Cape Province: Cape Peninsula, on an open slope above Oatland Point, near Simonstown, 600—700 ft., *Pillans* 9551 (*type*, in Bolus Herbarium), 9252: Caledon Div., Houw Hoek Mts., *Schlechter* 5499, *L. Guthrie* 391, *Compton* 7899, *Esterhuysen* 1848; Paarde Berg, Highlands, *Compton* 12333. Fl. Sep.—Nov.

Perhaps the most striking features of this species are the curving of the leaf-rachis either to right or left and also the marked hooding of the leaves, which, interlocking at the tips, form almost globular cages,



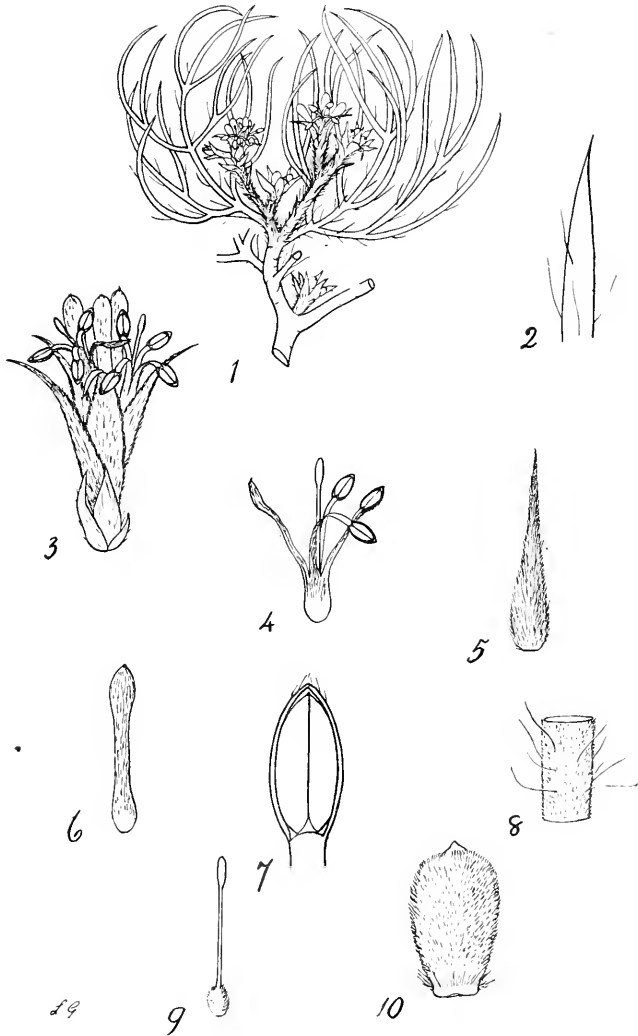


FIG. 7. *Serruria inconspicua* L. Guthrie & Salter. 1. Flowering shoot, natural size. 2. Leaf tip  $\times 5$ . 3. Flower head  $\times 4$ . 4. Flower  $\times 5$ . 5. Floral bract  $\times 5$ . 6. Bud  $\times 5$ . 7. Limb of perianth segment, much enlarged. 8. Section of young stem  $\times 3$ . 9. Ovary, with style  $\times 5$ . 10. Fruit  $\times 5$ . (*Pillans* 9551.) *Del.* L. Guthrie.

3—4 cm. in diam., around the very inconspicuous inflorescences. Its nearest affinities are *S. Knightii* Hutchinson and *S. pauciflora* Phillips & Hutchinson. In addition to the characters referred to above it differs from both these species in having the leaves pinnate nearly to the base, smaller inflorescences and flowers and a much shorter style.

**Gazania maritima** Levyns. (Compositae—Cynareae.)

Planta herbacea, perennis, repens. Folia pinnata, supra viridia, infra lanata, marginibus revolutis, petiolis spinuloso-ciliatis. Involucri bractee 2—3-seriatae, inter basibus concreatæ, fere glabrae, lobis triangularis, acuminatis.

A perennial with a prostrate, creeping stem, rooting at intervals, possessing latex. Surface of the stem somewhat sticky, frequently with grains of sand adhering to it. *Leaves* up to 7·5 cm. in length but usually shorter, pinnately lobed, rarely entire, lobes 3—11, elliptical or narrowly obovate in shape, revolute, green and glabrous above, white and woolly below with the midrib protruding, the petiole provided with a number of distantly placed, spine-like teeth along the margin, sheathing at the base. *Peduncle* about as long as the leaves, usually with 1—few linear bracts. *Involucre* slightly sticky, almost glabrous, the tips of the bracts usually a little shorter than the concrete base, triangular, sharply acute, the outer usually ciliate with short, spine-like hairs. *Ligulate flower* yellow with a dark stripe down the back. *Tubular flower* with a delicate pappus, consisting of very narrow, pointed scales about half the length of the slender corolla, the pappus scales often breaking up into hairs in the dry condition; ovary densely covered with silky, upright hairs about four times the length of the ovary.

*Hab.* Cape Province, Cape Division; Cape Point, *Levyns* 7570 (type; in the Bolus Herbarium); Smitswinkel Bay, *Compton* in the Bolus Herbarium 16953; Miller's Point, *Salter* 6479: Stellenbosch Division; Mouth of the Steenbras River, *Levyns* 6033.

Found close to the sea, either near the shore or among rocks on cliffs. *Flowering season*: November to February.

**Metalasia caespitosa** Levyns. (Compositae—Senecionideae.)

*M. cephaloti* (Thunb.) Less. affinis sed caudicibus gracilioribus, capitulis 5 floribus, et setis apicibus dilatatis differt.

A low, tufted shrub, about 30 cm. high, frequently with several branches arising about ground level from an old burnt base. *Stems* woolly when young. *Leaves* ericoid, twisted, mucronate, the upper surface woolly, the lower becoming more or less glabrous with age; leaves on the main stem about 15 mm. in length, those of the axillary

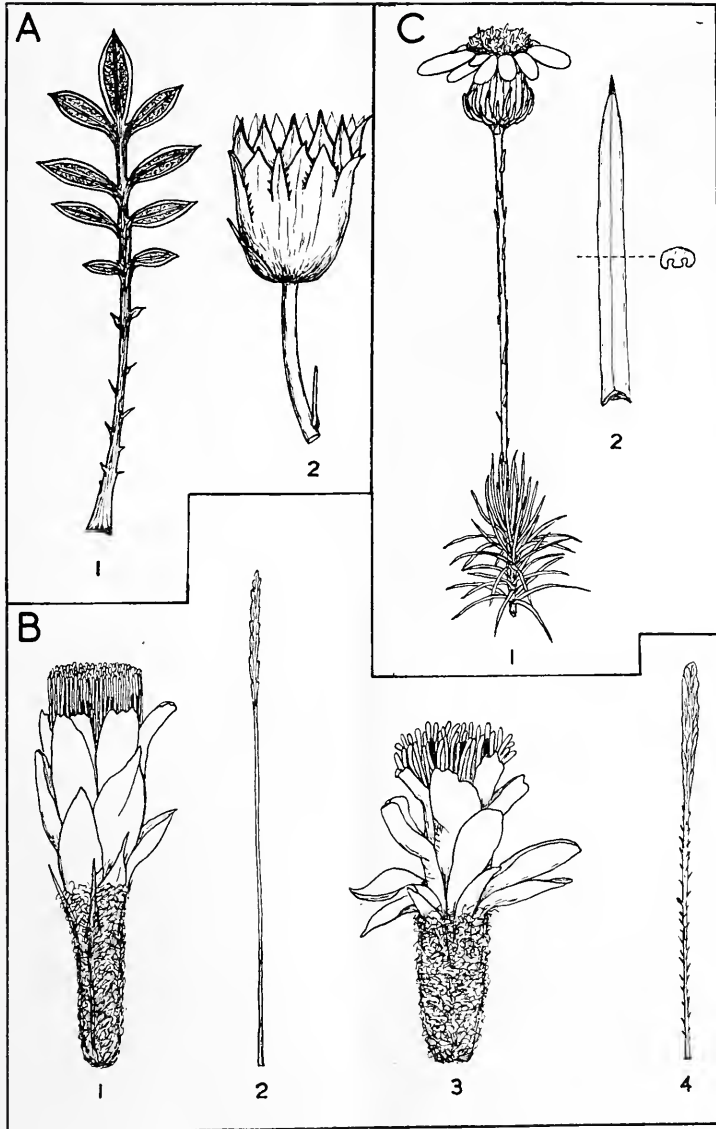


FIG. 8. **A.** *Gazania maritima* Levyns. 1. Lower surface of leaf  $\times 1\frac{1}{2}$ . 2. Involucre with flowers removed  $\times 1\frac{1}{2}$ . **B.** 1. Capitulum of *Metalasia Cephalotes* Less  $\times 8$ . 2. Bristle of the pappus of *M. Cephalotes*  $\times 15$ . 3. Capitulum of *Metalasia caespitosa* Levyns  $\times 8$ . 4. Bristle of the pappus of *M. caespitosa*  $\times 15$ . **C.** *Senecio Pillansii* Levyns. 1. Tip of flowering shoot, nat. size. 2. Leaf viewed from above and a transverse section in outline, showing the two grooves which are filled with woolly hairs  $\times 2$ .

shoots much shorter. *Capitula* about 7 mm. long, sessile in groups, densely clustered at the ends of the branches, capitula of each group lightly held together by woolly hairs of the involuere. *Involucral bracts* in several rows, somewhat spreading, the outer pale brown, acute, densely woolly at the base, the inner white or pink in the upper part, the innermost row obtuse and slightly toothed. *Flowers* 5. *Corolla* dark, purple-red in colour. *Pappus bristles* pure white and almost spatulate at the tip, scabrous below. *Fruit* glabrous.

*Hab.* Cape Province, Cape Division; Redhill, Simonstown, *Levyns* 5316 (type; in the Bolus Herbarium); Raapenburg, *Guthrie* 231; Constantiaberg, *Levyns* 7568; Tokai, *Levyns* 5607; Boy's Kraal River, *Levyns* 7569; Caledon Division; Houw Hoek, *Bolus* 5076.

*Flowering season*: November to February.

This plant has hitherto been confused with *M. cephalotes* which is a much stouter and more woody plant. The present species has a somewhat spreading involuere and a different pappus (Fig. 3B). Both are found, often growing together, in sandy places.

**Senecio Pillansii** Levyns. (Compositae—Senecionideae.)

*Fruticulus* decumbens vel crectus. *Folia* conferta, acicularia, mucronata, pungentia, revoluta, superne glabrescentia, nitida, subtus araneosotomentosa. *Capitula* radiata, lutea, solitaria vel 2—3. *Pedunculi* longi, bracteis parvis. *Achaenia* costata, hirsuta.

A shrub, decumbent or erect, 40 cm. in height or less. *Stems* woody, naked at the base, closely leafy above. *Leaves* stiff, erect, patent or recurved, up to 2 cm. in length, acicular, pungent-mucronate, decurrent, revolute, upper surface cobwebby when young, glabrous and shining later, the surface somewhat rough but not scabrous, lower surface with white wool in the grooves on either side of the midrib. *Capitula* radiate (rarely discoid), yellow, up to 2 cm. in diam., usually borne singly at the ends of long, wiry peduncles furnished with small, inconspicuous, scattered bracts, the peduncle occasionally branched and bearing 2 or 3 capitula. *Main involucral bracts* numerous, glabrous, smaller basal bracts in several rows. *Receptacle* flat with small teeth between the flowers. *Ligulate flowers* 18—24, the rays rather short and unequal. *Tubular flowers* numerous. *Fruits* somewhat ribbed, covered with short, rather coarse, adpressed hairs.

*Hab.* Cape Province, Cape Division; between Karbonkelberg and Little Lion's Head, *Salter* 7868 (type; in the Bolus Herbarium), *Salter* 2862; Bredasdorp Division; near Elim, *Bolus* 8558, *Schlechter* 9669; near Agulhas, *Pillans* 8136, *Salter* 4149.

**Senecio wittebergensis** Compton. (Compositae—Senecionideae.)

## § Sinuosi.

Herba perennis. *Folia basalia* petiolata, lamina oblongo-elliptica, irregulariter inciso-pinnatifida, supra scabrido-puberula, infra lanata, marginibus reflexis. *Folia caulina* similia sed sessilia. *Caules* expansi, parum ramosi, in capitulis singulis terminantes. *Capitulum* discoideum. *Involucri bractae* c. 21, angustae, attenuatae, sublanatae, calyculis paucis. *Receptaculum* planum. *Flosculi* 50—60. *Achaenia* striata, puberula. *Pappus* copiosus, albus, sericeus.

*Hab.* Cape Province: Laingsburg Division; Witteberg summit, near Bantams, alt. 1,600 met., in sandy soil, *Compton* 12136 (Type, in National Botanic Gardens Herbarium), 27 Oct., 1941.

*Description.*—A small herbaceous perennial plant. The rootstock is not densely woolly at the crown. Basal leaves several with an elliptic-oblong lamina about 2 cm. long, 1 cm. wide, which is irregularly inciso-pinnatifid, the lobes bluntly apiculate, the margin reflexed, the upper surface scabrid-puberulous, the lower surface lanate, glabrescent, and which contracts to a narrowly winged petiole about 3 cm. long. Flowering shoots few, spreading, sinuous and decumbent, branching slightly and terminating in 1—3 capitula, the stem being pale, striate, thinly cobwebbed, glabrescent, and the cauline leaves being few and sessile, their lamina like that of the basal leaves but smaller and less lobed, and reduced to a few small linear bracts on the peduncle. Capitulum discoid, oblong, about 15 mm. long and 10 mm. diam. Involucre of about 21 erect narrow rigid acuminate bracts about equalling the florets, thinly cobwebbed, narrowly membrane-edged, with 3 or 4 basal calyces. Receptacle flat. Florets c. 50—60, hermaphrodite, the corolla slender, yellow, c. 9 mm. long. Achenes brown, striate, pubescent on the ridges. Pappus copious, soft, fine, silky, white, c. 9 mm. long.

Only collected on one occasion, and not matched from other parts of the Witteberg visited or from other localities. *Senecio wittebergensis* seems to be most closely related to *S. erosus* L.f., but is a much smaller plant, of spreading habit, without the woolly crown of the rootstock, with slightly branched aerial shoots and without ray florets.

**Felicia karooica** Compton. (Compositae—Asteroideae.)

Fruticulus expansus, fere glaber. *Folia* alterna, elongata, anguste linearia, plerumque curvata, base amplexicaulia, marginibus involutis, apicibus attenuatis, apiculatis, superiora sparse glanduloso-puberula. *Pedunculus* erectus, parum elongatus, glanduloso-puberulus. *Capitulum* solitarium, late campanulatum. *Involucri bractae* sub-3-seriatae, sparse puberulae. *Flosculi* omnes fertiles: *radii* c. 13, feminei, ligulati: *disci*

numerosi, tubulati, hermaphroditi. *Achaenia* sericeo-hirsuta. *Pappi setae* biseriatae, subrigidae, barbellatae, exteriores breves, interiores elongatae.

*Hab.* Cape Province. Laingsburg Division : Karoo Garden, Whitehill, 900 met. alt., *Compton* 11808 (Type, in National Botanic Gardens Herbarium), 22 Sept., 1941 ; *Compton* 9729, 4 Oct., 1940 ; *Compton* 5612, 9 Sept., 1935 ; *Compton* 9260, 2 Sept., 1940 : Whitehill Ridge, 1,000 met. alt., *Compton* 9275, 2 Sept., 1940 : Matjesfontein, *Bolus* 14407.

*Description.*—A small, rigid, divaricately branched shrub. Stems glabrous except for a few axillary hairs, reddish when young, darkening with age. Flowering shoots ending in an erect one-headed peduncle. Leaves alternate, linear from a clasping base, long-attenuate to a sharp point, usually curved, the margins incurved, reaching 35 mm. long and 1.5 mm. wide, mostly glabrous except for a few hairs at the base on the upper surface ; the uppermost leaves, however, are shortly gland-puberulous, and so is the peduncle, increasingly so towards the distal end. Peduncle not very long, 1.0 to 1.3 mm. in diam., joining the capitulum abruptly. Capitulum up to 5.0 cm. in diam. overall, usually rather less, broadly campanulate. Involucral bracts sub-3-seriate, of unequal length, the innermost up to 9 mm. long, linear-oblong, narrowly membrane-edged, dorsally minutely gland-puberulous. Ray florets c. 13, ligulate, female, mauve, the tubular part 4 mm. long, slightly hairy, the ligular part c. 20 mm. long, 2 mm. wide, rolling up when dry, usually with 5 (or less) very slender filiform staminodes which are exserted at the mouth of the tube, the style exserted, stigmas filiform, 3 mm. long. Disc florets tubular, numerous, hermaphrodite, the corolla yellow, the tube slightly hairy, 8 mm. long, the lobes 1 mm. long. All the florets fertile. Achenes flattened, dark, silky-hairy on surfaces and edges. Pappus biseriatae, the outer bristles 1 mm. long, the inner bristles c. 8 mm. long, rather rigid, barbellate.

This beautiful species flowers regularly in the Karoo Garden enclosure, but is seldom seen outside owing to grazing. Its capitula reach two inches in diameter, the mauve ray florets being specially long and narrow. It is most nearly related to *Aster Bowiei* Harv. (Fl. Cap. III. 73, 1875). I have seen the type of this species, an unlocalised collection by Bowie in the Kew Herbarium, the "solitary specimen" from which Harvey made his description. Dr. H. G. Fourcade has recently shown me a plant from the Tsitsikamma region (in which Bowie collected) which agrees with Harvey's description and which probably localises the source of the type gathering of *A. Bowiei*. From this plant *Felicia karooica* differs in its larger flower heads, its shorter and more puberulous

peduncles and its different leaf base. Harvey does not mention an outer pappus in *A. Bowiei*: if he had seen it he would have placed the species in Diplopappus. *Felicia karoocia* has a well-marked outer pappus of short stiff bristles: Dr. Fourcade informs me that his specimen also has an outer pappus, but I am not at present able to ascertain whether it occurs in the Bowie plant.

*Aster lasiocarpus* (DC) Harv. is a problematical species, apparently resembling this. It was collected by Drège "between Hexrivier and the Bokkefeld, 3,000-4,000 ft." Harvey did not see the type collection, but quotes De Candolle. The pappus is said to be rufous (which does not agree with my plant), and the capitulum to be 9—10 lines in diameter (which would be about correct for my plant if the ray florets were excluded from the measurement).

***Felicia odorata* Compton.** (Compositae—Asteroideae.)

Fruticulus, ramis angustis, divaricatis, teretibus, molliter hirsutis. *Folia* patentia, alterna vel subopposita, simplicia, subpetiolata, elliptica vel oblanceolata, integra, plana, subobtusata, utrinque hispidulo-setosa. *Pedunculus* striatus, elongatus, molliter hirsutus. *Capitulum* solitarium, late campanulatum, odoratum. *Involucri bracteae* sub-3-seriatae, apice obtusae, marginibus membranaceis, fimbriato-ciliatis. *Flores* omnes fertiles; *radii* feminei, ligulati, c. 8 vel c. 13; *disci* hermaphroditi, tubulati, numerosi. *Achaenia* sparse hirsuta. *Pappi setae* uniseriatae, barbellatae, flavescens.

*Hab.* Cape Province. Laingsburg Division: Ngaap Kop, 1100 met. alt., Compton 9284 (Type, in National Botanic Gardens Herbarium), 2 Sept., 1940.

*Description.*—A small, slender, divaricately branched shrub. Stems terete, softly grey-hirsute. Leaves patent, alternate or sub-opposite, simple, sub-petiolate, elliptical or oblanceolate, the margins entire, flat, both surfaces hispidulous with short white broad-based hairs, the midrib prominent, the apex sub-obtuse, c. 10 mm. long, 3 mm. wide. Peduncle striate, elongated, 3—4 cm. long, erect, softly hirsute. Capitulum solitary, sweet-scented, 3 cm. in diam., usually less, broadly campanulate. Involucral bracts sub-3-seriate, thinly hirsute, obtuse, the margins membranous, fimbriate-ciliate, the innermost c. 6 mm. long. Florets all fertile. Ray florets female, usually about 8, sometimes about 13, narrow-ligulate, the tubular portion 3 mm. long, thinly hairy, the ligular portion c. 11 mm. long, 2 mm. wide, mauve. Disc florets numerous, yellow, tubular, the tube c. 6 mm. long, the lobes 1 mm. long. Achene thinly hirsute on faces and edges. Pappus uniseriate, of about 20 densely barbellate bristles, yellowish.

*Felicia odorata* is most nearly related to *F. Dregei* DC., but is smaller and less luxuriant, and has a much rougher hairiness on the leaves, which is quite unlike that of the stem. The hairiness of the leaves is intermediate between that of *F. Dregei* and that of *F. scabridus* (E. Mey.). Like *F. Dregei* and *F. Rogersii* S. Moore (which also occurs at Whitehill) the capitula are strongly sweet-scented, the perfume lasting even after the flowers have been dried for many months.

***Felicia whitehillensis*** Compton. (Compositae—Asteroideae.)

Fruticulus rigidus. *Folia* parva, plana, linearia vel anguste spathulata, integra vel interdum utrinque unidentata, base angustata, apice obtusa vel subapiculata, plurima glabra, superiora parum puberula. *Pedunculus* brevis, parum sub capitulo puberulus. *Capitulum* solitarium, late campanulatum. *Involucri bractea* sub-3-seriatae, attenuatae, glabrae, marginibus membranaceis, supra fimbriatis. *Flosculi* omnes fertiles; *radii* feminei, c. 8, ligulati, tubo breve, hirsuto; *disci* hermaphroditi, tubulati, antheris longe exsertis. *Achaenia* longe dense appresse sericeo-hirsuta. *Pappi setae* uniseriatae, subplumosae, subfuscae.

*Hab.* Cape Province. Laingsburg Division: Karoo Garden, Whitehill, 900 met. alt., Compton 11261 (Type, in the National Botanic Gardens Herbarium), 18 August, 1941: Compton 9862, 2 September, 1940.

*Description.*—An almost glabrous, rigid, divaricately branched, small shrub. Young stems striate. Leaves with a few axillary hairs, alternate, scattered, simple or sometimes with a short lobe on each side, linear or narrowly spathulate, flat, narrow-based, obtuse or sub-apiculate, glabrous or the ones nearest the capitulum slightly puberulous, 4—10 mm. long, 1—2 mm. wide. Peduncle erect, scarcely elongated, slightly puberulous. Capitulum solitary, broadly campanulate, overall diameter up to 4 cm., usually less. Involucral bracts sub-3-seriate, glabrous, attenuate, membrane-edged, fringed near the apex. All the florets fertile. Ray florets c. 8, female, ligulate, mauve, the tubular portion 2 mm. long, thinly hirsute, the ligular portion c. 13 mm. long, 2.5 mm. wide, thinly puberulous. Disc florets numerous, hermaphrodite, tubular, yellow, the tube 6 mm. long, broadening above, the lobes 1 mm. long, the anthers long-exserted. Achenes densely long-appressed-sericeous-hirsute. Pappus bristles uniseriate, softly sub-plumose, dull yellowish, 9 mm. long.

This species is well marked by its small glabrous flat obtuse leaves, usually entire, sometimes with a single lobe on each side. The capitula, though large, have usually only about 8 ray florets. The achenes are strikingly silky-hirsute. Only one series of pappus bristles is present.



It does not appear to have close relationship with any other species, but perhaps its nearest affinity is with *Felicia Dregei* DC.

**Relhania lanata** Compton. (Compositae—Inuloideae.)

Fruticulus rigidus, subspinescens, aromaticus. *Rami* divaricati, juventute sparse lanati. *Folia* parva, opposita, elliptica vel obovata, utrinque dense lanata, marginibus integris, planis vel parum involutis, sicut mesonevro glandulis sparse vel dense indutis. *Capitulum* solitarium, sessile. *Involucrum* campanulatum, bracteis numerosis, multi-seriatis, appressis, coriaceis, glabris, obtusis, marginibus apicibusque membranaceis. *Flosculi* flavi, omnes fertiles; *radii* feminei, ligulati, 13—18; *disci* tubulati, hermaphroditi. *Paleae* numerosae, anguste lineares, infra opacae, glandulosae, supra membranaceae. *Pappi setae* uniseriatae, breves, flavae, ex labro duro orientes.

*Hab.* Cape Province. Laingsburg Division: Ngaap Kop, 1,100 met. alt., Compton 9246 (Type, in National Botanic Gardens Herbarium), 2 Sept., 1940.

*Description.*—A small aromatic, rigid, divaricately branched, subspinescent shrub. Young stems thinly lanate, glabrescent. Leaves opposite, elliptical or obovate, up to c. 8 mm. long, 4 mm. wide, coriaceous, flat or the margins slightly involute, densely woolly on both surfaces, the midrib prominent below and both it and the margins bearing a few or many stout short-stalked glands. Many of the branches taper and end as semi-spines: immediately below each capitulum is often a pair of very slender branchlets bearing one or two pairs of small leaves and hardening to spines. Capitulum solitary, sessile among the upper leaves, about 2 cm. in diam. Involucre campanulate, of numerous multi-seriate bracts which are appressed, up to 8 mm. long, horny, the innermost with membranous margins and apices, glabrous, obtuse. Ray florets female, 13—18, yellow, the tubular part 3 mm. long, the ligular part 7 mm. long, 2.5 mm. wide. Disc florets hermaphrodite, yellow, tubular, the tube 4 mm. long, slender below, dilated above, the lobes 1 mm. long. Paleae numerous, narrow, linear, opaque and thinly glandular below, membranous above, 7 mm. long, 0.5 mm. or less wide. All florets fertile. Achenes beakless. Ray achenes with a few hairs, disc achenes glabrous. Pappus uniseriate, of several short, narrow yellow scales, sub-equal in length, arising from a hard rim.

A very distinct species of *Relhania*, resembling in general appearance certain species of *Nestlera* (e.g. *N. humilis* Less.) and *Rosenia* (e.g. *R. nestleroides* Compton). It is well characterised as a *Relhania*, however, by its well-developed paleae and uniseriate pappus, and as a species by its sub-spinescence, woolly leaves and solitary capitula.

**Othonna oleracea** Compton. (Compositae—Senecionideae.)

§ Caulescentes.

Herba perennis. *Tuber* subterraneum, obconicum, solidum, apice dense lanosum. *Folia basalia* pauca, glabra, longe petiolata, lamina obovata vel orbiculata, base plus minusve cuneata, apice rotundato vel obtuso, margine repando, sinuato vel obscure paucidentato, interdum lobis basalibus 1 vel 2. *Caules* annui pauci, glabri, simplices vel parum ramosi, in pedunculis terminantes, infra foliis paucis petiolatis vel sessilibus. *Pedunculus* longus, erectus, striatus, glaber. *Involucrum* glabrum, segmentis c. 13, attenuatis, acutis, base concrescentibus. *Flores radii* c. 13, ligulati, flavi, feminei, fertiles. *Flores disci* c. 50, tubulati, flavi, hermaphroditi, steriles. *Achaenia* dense et breviter pubescentia. *Pappus* copiosus, barbellatus.

*Hab.* Cape Province. Ceres Division : Karoo Poort, alt. 1,000 met., among quartzite rocks, *Compton* 6438 (Type, in National Botanic Gardens Herbarium), 25 Aug., 1935 ; *Burchell* 1203, 14 July, 1811 ; *Compton* 8902, 30 June, 1940 ; *Compton* 11163, 27 July, 1941 : Laingsburg Division, Whitehill Ridge, 1,000 met., *Compton* 10855, 16 June, 1941 : Clanwilliam Division ; Wupperthal, 600 met., *Bolus* 9034, 6 Oct., 1897.

*Description.*—A perennial plant with a solid obconical tuber up to 4 cm. in diam., which tapers to a stout primary root : the tuber is densely woolly at the apex, from which arise annual basal leaves and herbaceous flowering shoots. The basal leaves are few (3—4) and have slender petioles up to 5 cm. long which are narrowly winged and which broaden cuneately to the lamina in a gradual or sudden manner. The lamina varies from obovate to orbicular, up to 10 cm. long and 7 cm. wide, and is thick and soft in texture, membranous when dry, glabrous, the midrib distinct, the lateral veins slender, the margin entire, repand or sinuous or with a few faint broad teeth, occasionally with one or two basal lobes at the summit of the petiole, the apex rounded or obtuse. Flowering shoots 1—3, annual, reaching 30 cm. in height but usually less, terminating in a long erect peduncle bearing a single capitulum and having 1—3 cauline leaves near the base and 1—2 small bracts higher up the peduncle : lateral peduncles may be produced in the axils of these leaves and bracts. The lowest cauline leaf is petiolate and resembles the basal leaves : in the next cauline leaf the petiole is obsolescent, and in the next the lamina is sessile, amplexicaul, oblanceolate. Peduncle striate, glabrous. Capitulum c. 30 mm. diam. overall. Involucre glabrous, broadly campanulate, with about 13 segments which are c. 10 mm. long, gradually tapering to an acute point, narrowly membrane-edged, reticulately veined, concrescent at base. Receptacle dome-shaped, honeycombed. Ray florets about 13, ligulate, female,



FIG. 9. *Othonna oleracea*. 1. Plant, natural size. 2. L.S. capitulum  $\times 4$ . 3. Involucral bract  $\times 4$ . 4. Ray floret  $\times 4$ . 5. Stigmas of ray floret  $\times 6$ . 6. Disc floret  $\times 4$ . 7. Stamens of disc floret  $\times 6$ . 8. Sterile stigma of disc floret  $\times 6$ . 9. Portion of pappus hair  $\times 60$ . 10. Achene  $\times 2$ . 11. Achene after boiling  $\times 2$ . (1 - 9, Compton 8902, del. M. Walgate: 10 - 11, Compton 6438, del. W. F. Barker.)

fertile, the corolla yellow, c. 17 mm. long, 2.5 mm. wide, the ovary minutely papillose, the stigmas linear, obtuse. Disc florets c. 40—60, tubular, hermaphrodite, sterile, the corolla yellow, the proximal part narrow, 2 mm. long, the distal part campanulate, 3 mm. long, the pappus hairs 8—12, the stigma short, thickened, scarcely bifid. Ray achene c. 6 mm. long, 2 mm. wide, densely covered with a short brownish pubescence which becomes mucilaginous when wetted, the pappus copious, pale yellowish, straight, barbellate, 10 mm. long.

This *Othonna* varies greatly in all its dimensions according to locality and season: it may have its full number of basal and cauline leaves or it may lack some of them. It is most nearly related to *O. tuberosa* Thbg., a plant of the Cape Peninsula and district, from which it differs much in the size, form and proportions of its parts. It is one of several closely related species of this section, extending from Namaqualand to the Great Zwartberg, many of which still remain to be described.

## SOME CHANGES IN NOMENCLATURE. III.

I. By R. S. ADAMSON.

### ELAPHOGLOSSUM.

On the Cape Peninsula there are two allied species of *Elaphoglossum* : one has dark green usually leathery leaves with scales on the petioles and on the underside at least of the midrib and a rhizome clothed by dense chestnut-brown oval scales ; the other has paler green leaves longer in proportion to the width with the blade narrowly cuneate at the base and glabrous except for a few scales at the base of the petiole and a rhizome with dark brown scales with narrow points. Both species vary considerably in size and in the texture of the leaf also in the degree to which the veins are apparent. In both the fertile leaves may be like the sterile ones or longer and narrower.

In South African collections the first of these species is generally labelled "*E. conforme*", the second "*E. petiolatum*", though small states of the first are often labelled "*E. petiolatum* var. *rupestre*". Both were first described by Swartz under *Acrostichum* as *A. conforme* Syn. Fil. 10. t. 1. fig. 1, 1806, and *A. petiolatum* Fl. Ind. Occ. 1588, 1804. Swartz (Syn. Fil. 10 and 192-3) gives full descriptions. His distinguishing characters are :—

- A. conforme*, petioles glabrous, leaves decurrent on the petiole, veins obscure, all leaves glabrous.
- A. petiolatum* (*A. viscosum*) petioles with scales, leaves less decurrent on the petiole, veins more distinct, fertile leaves with hair-like scales.

It thus appears that the ordinary usage in South Africa is a transposition of the real connotation of the names. This transposition arose from a number of causes. In the period following the first description emphasis was laid on the similarity or otherwise of the sterile and fertile leaves and confusion soon arose. Kaulfuss (Enum. Fil. 62. 1824) altered the connotation of *A. conforme* which he described as "frondibus . . . utrinque squamulosis". This was followed by Schlechtendal (Adumb. 14. 1825) who recognised two species and applied Kaulfuss' definition to "*A. conforme*" and emended *A. angustatum* Schrad. for the other. Sim (Ferns S. Afr. ed. 1. 219 1892 ; do. ed. 2. 285. 1915) realised the confusion but failed to clear it up satisfactorily. He laid emphasis on

the coriaceous leaf of *E. conforme* as opposed to the thinner texture of *E. petiolatum* though in fact the difference is more often the reverse. Sim's figures do not clearly show the leaf characters of the two species (l.c. ed. 2. t. 147. 149).

On the Peninsula *E. petiolatum* is much the commoner of the two. Var. *rupestre* Sim (l.c. ed. 2. 288. 1915) seems merely a dwarf state from dry or exposed situations.

To avoid further confusion the synonymy of the two species is given :—

**E. conforme** (Sw.) Schott. Gen. Fil. t.34. 1834.

*Acrostichum conforme* Sw. Syn. Fil. 10 & 192. 1806.

*A. angustatum* Schrad. ex Schlecht. Adumb. 14. 1825.

*Olfersia angustata* Presl Tent. Pter. t. 1836.

**E. petiolatum** (Sw.) Urban Symb. Ant. 4. 61. 1903.

*Acrostichum petiolatum* Sw. Fl. Ind. Occ. 1588. 1804.

*A. viscosum* Sw. Syn. Fil. 10. & 193. 1806.

*A. conforme* Kaulf. Enum. Fil. 62. 1824.

*Olfersia conformis* Presl. l. c.

#### PENTASCHISTIS.

**P. angulata** (Nees) Adamson comb. nov. The description of *Danthonia (Pentaschistis) angulata* Nees Fl. Afr. Aust. 313. 1841. agrees completely with that of *P. leucopogon* Stapf Fl. Cap. VII. 500. 1899. and there can be little doubt that both refer to the same plant. Stapf himself suggested this and his hesitation in accepting Nees' name seems to have been due to the latter having associated his species with *P. nutans* and *P. tortuosa*.

**P. involuta** (Steud.) Adamson comb. nov. vice *P. argentea* Stapf. Steudel's description of *Danthonia involuta* (Syn. Pl. Glum. I. 240. 1855) agrees with plants of *P. argentea* Stapf Fl. Cap. VII. 487. 1899, and though the type specimen has not been seen there seems no reason to doubt the identity of the two.

#### LASIOCHLOA.

**L. echinata** (Thunb.) Adamson comb. nov. Thunberg's specimens of his *Alopecurus echinatus* are identical with the plant later described as *L. ciliata* Kunth (Rev. Gram. II. 555. t. 192. 1829). Thunberg incorrectly describes his species as having single flowers in the spikelet. (Fl. Cap. ed. Schult. 105. 1823.)

**L. longifolia** Kunth var. *hirta* Adamson var. nov. *L. hirta* Kunth only differs from *L. longifolia* in the hairy leaves of a blue-green colour not changing to purple and usually in the smaller spikes. It is not

more than a variety as Kunth himself suggested. (Enum. Supp. I. 322. 1836.)

#### EHRHARTA.

**E. ramosa** Thunb. var. **aphylla** (Schrad.) Gluckman comb. nov. Mrs. E. Gluckman in revising the species of *Ehrharta* has come to the conclusion after examining a wide range of material that *E. ramosa* and *E. aphylla* are not specifically distinct and that at most the latter is a variety of the older species.

#### JUNCUS.

**J. stenopetalus** Adamson nom. nov. vice *J. Sprengelii* (Nees, Linnaea XX. 244. 1847) Buchen. Mon. Junc. v. Kap 449. 1875 which is antedated by *J. Sprengelii* Willd. Prodr. Fl. Ber. 125. 1787.

#### PHARNACEUM.

**P. brevicaule** (DC) Bartl. This is the annual species commonly placed by S. African botanists under *P. subtile* E. Mey. ex Fenzl, but which differs from the description of that in a number of characters the most important of which are: (a) the leaves are all linear, (b) the stipules are not minute, (c) the cymes are not sessile, (d) the capsule is distinctly longer than the perianth, and (e) the seeds are smooth or minutely granulate not reticulate. The plant described as *P. dichotomum* var. *filifolia* Sond. Fl. Cap. I. 141. 1859, is the same but the differences from *P. dichotomum* are such that it is much better regarded as a separate species.

*P. subtile* is a doubtful species which has not been collected at all in recent years. It appears to be related to if not identical with *P. pusillum* Schlechter.

**P. Thunbergii** Adamson nom. nov. vice *P. distichum* Thunb. Hoffm. Phyt. Blæf. I. 60. 1803, which is antedated by *P. distichum* L. Mant. II. 221. 1771. The last is a quite different plant.

Records of *P. Thunbergii* from the S.W. Cape, including the Cape Peninsula, are based on errors in determination. The specimens are shade forms of *P. cordifolium* L. (*P. obovatum* Bolus).

#### LIGHTFOOTIA.

**L. parvifolia** (Berg.) Adamson comb. nov. The description of *Lobelia parvifolia* Berg. Desc. Pl. Cap. 345. 1767 agrees with that of *Lightfootia oxycoccoides* L'Herit. Sert. Ang. I. t.4. 1788 and both evidently refer to the same plant.

*Lobelia parvifolia* R. Br. Prodr. 564. 1810 is a quite different plant.

## LOBELIA.

The name for the well-known species, *L. triquetra* L. Mant, 120. 1767, is antedated by *L. corymbosa* Berg. Descr. Pl. Cap. 344. 1767, and by *L. comosa* L. Sp. Pl. ed. 2. 1323. 1764. The former certainly refers to the same plant. Since the time of De Candolle *L. comosa* L. has been treated as a variety of *L. triquetra* (Prodr. VII. 370. 1838) though it is quoted as a synonym in *Index Kewensis*. Linnaeus' description is based on Hort. Cliff. 500. 1737. Though the specimen is not at present available for comparison the description, which is contrasted with that of *L. coronopifolia*, is generally applicable to the common species though from the phrases "pedunculis brevissimis" "foliis longitudine florum" "spica . . . foliosa" it would appear that a somewhat unusual form was being described. The commoner form on which Linnaeus certainly based his later description of *L. triquetra* has pedicels longer than the bracts and the whole inflorescence distinctly pedunculate. Bergius was also describing the common form: he quotes *L. comosa* L. with a query under his *L. corymbosa*.

The species in the field is a variable one in habit and in the form of the inflorescence, the pedicels extend greatly in the fruiting stage, the bracts vary from quite small to leaf-like structures (var. *secundata* Sond.). Linnaeus seems to have had a rather extreme state with leaf-like bracts which may have been the result of cultivation but his plant does not seem separable and his original name must stand. The synonymy is:

*L. comosa* L. Sp. Pl. ed. 2, 1323, 1764.

*L. corymbosa* Berg. l. c.

*L. triquetra* L. l. c. 1767.

*L. capitata* Burm. f. Prodr. Pl. Cap. 25. 1768.

*L. corymbosa* Grah. Edin. N. Phil. Journ. 385. 1826 which is *Isolobus corymbosus* (Presl.) A.DC. is a quite different plant.

## MEZLERIA.

The two allied species *M. depressa* Sond. and *M. Dregeana* Sond. were first separated as distinct entities by Sonder (Fl. Cap. III. 533. 1865). Previously they had been regarded as constituting a single species which was first described as *Lobelia depressa* L.f. (Supp. Pl. 395. 1781) and later transferred to *Mezleria* by Presl (Prod. Mon. Lob. 7. 1835). Authors previous to Sonder tended to emphasise the features of one or other of the segregates according to the material available, thus Thunberg (Prod. Pl. Cap. 39. 1794; Fl. Cap. ed. Schult. 178. 1823) gave a description of the plant later segregated as *M. depressa* Sond. Presl probably had the same segregate in mind.



De Candolle (Prodr. VII. 350 & 378. 1838) first realised that there might be two species concerned but his arrangement did little to clarify the matter ; he treated *Lobelia depressa* L.f. and *Mezleria depressa* Presl as distinct species and made a variety, var. *Thunbergii*, under the former. Sonder was evidently influenced by this scheme though he placed both his species under *Mezleria*. He acts in contravention of the international rules in quoting *L. depressa* L.f. as a synonym of one of his species and *M. depressa* Presl as a synonym of the other ; the two are themselves synonyms.

The essential point in the nomenclature of the species is the identity of the plant described by Linnaeus f. In reply to queries Messrs. Sprague and Milne-Redhead of Kew write on this : " We have examined the specimens of *Lobelia* in the Linnaean Herbarium and in that of Sir J. E. Smith and have been unable to find the type specimen of *Lobelia depressa* L.f. It is known that part of the herbarium of the younger Linnaeus was retained in Sweden. Lindman (Arkiv. för Bot. VII. no. 3. 1908 & IX. no. 6. 1910) states that there are about 2,000 Linnaean specimens (from both father and son) in the Swedish Natural History Museum at Stockholm, but no species of *Lobelia* is cited in the accompanying enumeration. It would appear therefore that the type-specimen has been lost. In that case we have to interpret *L. depressa* L.f. by means of the original description. Assuming that it was one of the two species described by Sonder under the names *Mezleria depressa* and *M. Dregeana*, there are two reasons for assigning it to the latter : (1) it is not stated that the leaves are petiolate, although this fact is mentioned for the other petiolate species of *Lobelia* described in the same work. Hence we may assume that they were sessile. (2) The peduncles are stated as being as long as the leaves. These two points are characteristic of *M. Dregeana*. On the present evidence we may accordingly assume that *Lobelia depressa* L.f. is the plant described by Sonder as *Mezleria Dregeana*. That plant must therefore bear the name *Mezleria depressa* (L.f.) Presl . . . The plant described by Sonder under the name '*Mezleria depressa*' will require a new name."

Further support for this conclusion may be obtained from the original description which states that the plant is prostrate and has purple flowers both of which apply to *M. Dregeana* Sond. but not to *M. depressa* Sond.

There is of course the possibility that Linnaeus f. was describing a Thunberg specimen and that the type-specimen is in the Thunberg Herbarium. This is unlikely, firstly because of the divergence between the original and Thunberg's descriptions, secondly because it was as a rule noted when a Thunberg specimen was described. The species before and after this one in the work are so noted but not this. Under the

circumstances it may be taken that *Lobelia depressa* L.f. is the same plant as *Mezleria Dregeana* Sond. The other species is now named *Mezleria limosa*, the specific epithet being taken on account of the habitat. The synonymy:—

**Mezleria depressa** (L.f.) Presl Prod. Mon. Lob. 7. 1835.

*Lobelia depressa* L. f. Supp. Pl. 395. 1781.

*M. Dregeana* Sond. Fl. Cap. III. 533. 1865.

*L. Sonderi* Zahlbr. Ann. K. K. Nat. Hofm. XCIII. 404. 1903.

**Mezleria limosa** Adamson nom. nov.

*M. depressa* Sond. l.e. not of Presl.

*L. depressa* var. *Thunbergii* DC. Prodr. VII. 378. 1838.

#### GRAMMATOTHECA.

**G. Bergiana** (Cham.) Presl vice *G. erinoides* Sond. Sonder's name was based upon *Lobelia erinoides* which was used in this sense by Thunberg but which Linnaeus (Sp. Pl. 932. 1753) first applied otherwise. Messrs. Sprague and Milne-Redhead write: "The specimen of *Lobelia caulibus ramosis procumbentibus, foliis lanceolatis serratis* (Hort. Cliff. 426) . . . is in our opinion a form of *L. Erinus* L. Linnaeus based *L. erinoides* (Sp. Pl. 932) on two citations, the first being the plant in Hort. Cliff., the second being Herm. Lugdb. 108. tab. 109. The latter in our opinion also represents a form of *L. Erinus*. The three sheets under *L. erinoides* in the Linnaean Herbarium were apparently added after 1755, since they are not recorded by Linnaeus . . . until the third enumeration (1767) (see Jackson Index to the Linn. Herb. 8. 26. & 98). They therefore cannot be regarded as types but they show that Linnaeus in 1767 included forms of *L. Erinus* under *L. erinoides* since . . . the first two sheets are forms of *L. Erinus*." Since *Grammatotheca erinoides* Sond. is an absolute synonym of *Lobelia erinoides* L. the name cannot be used for the plant described under it (Fl. Cap. III. 532. 1865).

#### POLYGONUM.

**P. setulosum** Rieh. vice *P. tomentosum* Willd. *P. tomentosum* Willd. Sp. Pl. II. 447. 1800 is antedated by *P. tomentosum* Schrank Baer. Fl. I. 669. 1789 which is a European species.

#### CRASSULA.

**C. brachyphylla** Adamson nom. nov. vice *C. brevifolia* (E. & Z.) Schonld.

The plant described as *Bulliarda brevifolia* Eck. & Zeyh. Enum. 290.

1837 was transferred to *Crassula* as *C. brevifolia* Schonld. Ann. Bol. Herb. II. 54. 1916. This combination was, however, invalid when made as it was antedated by *C. brevifolia* Harv. Fl. Cap. II. 339. 1862. Though the latter plant had been renamed as *C. Pearsonii* Schonld. Ann. S. Afr. Mus. 9. 47. 1912, Harvey's name must take precedence and Ecklon and Zeyher's species is left without a valid name under *Crassula*.

**C. capensis** (L.) Baill. vice *C. Septas* Thunb. This plant was first described as *Septas capensis* L. Amoen. Acad. 6. Pl. Rar. Afr. 13. 1760 (Sp. Pl. ed. 2. 489. 1764) and then transferred to *Crassula* as *C. Septas* Thunb. Prod. Pl. Cap. 57. 1794. This name has been in general use since. *C. capensis* (L.f.) Schonld. is *C. natans* Thunb.

## ROCHEA

**R. subulata** (L.) Adamson comb. nov. vice *R. odoratissima* (Andr.) DC.

The description of *Crassula subulata* L. Syst. Nat. ed. 10. 969. 1759; Sp. Pl. ed. 2. 404. 1764; Mant. 360. 1767, agrees well with the common plant generally known as *R. odoratissima* DC. Prodr. III. 394. 1828. The latter was based upon *C. odoratissima* Andr. Bot. Rep. t. 26. 1797. Further, according to Schonland, Trans. Roy. Soc. S. Afr. 17. 260. 1929, the specimens preserved as *C. subulata* in the Linnean Herbarium are also this plant. The plant described by Bergius, Desc. Pl. Cap. 83. 1767, and by Thunberg, Fl. Cap. ed. Schult. 284. 1823, as *C. subulata* is *R. odoratissima*. Schonland who examined Thunberg's herbarium states (Arkiv. f. Bot. 21A. 11. 1927) that the specimens there are of the same species. This evidence derived both from the descriptions and from the specimens leaves no doubt as to the application of the Linnean specific name and overrules difficulties that have arisen from later misapplications though these led Schonland (l.c.) to suggest that the name *C. subulata* L. should be dropped as a *nomen confusum*. The difficulties started by the identification by Willdenow, Sp. Pl. I. 2. 1559. 1799, of the figure, Herm. Lugdb. 555. t. 552, quoted by Linnaeus under *C. subulata*, as being *C. ramosa* Thunb. Nov. Act. Leop.-Carol. 6. 330. 1778 (*C. Sphaeritis* Harv. Fl. Cap. II. 359. 1862) and this last species is preserved in his herbarium under the name *C. subulata* (fide Schonland l.c.).

Later, Harvey, Fl. Cap. II. 352. 1862, described a totally different plant as *C. subulata* which was based upon *Thysantha subulata* Hook. Ic. t. 590. 1842. This plant is now known as *C. transvaalensis* O. Kuntze ex Schonld. Ann. Bol. Herb. II. 66. 1916.

The plant distributed by Ecklon and Zeyher as *C. subulata* is not that species but *C. cynnosa* L.

## SOLANUM.

**S. guineense** L. vice *S. aggregatum* Jacq. Though the Linnean name has been relegated to synonymy there is no doubt that the original description applies to the plant generally placed under Jacquin's name. Jacquin's description and figure, Coll. IV. 124. 1790, were of the plant described as *Atropa solanacea* L. Mant. alt. 205. 1771, consequently in any case his name is invalid under the International Rules. *Atropa solanacea* L. appears to be the same plant as *S. guineense* L. Sp. Pl. 263. 1753, and, however unsuitable, the original name must stand. *S. guineense* Lam. Illustr. 2339 is a different plant based upon *S. nigrum*  $\delta$  *guineense* L. Sp. Pl. ed. 2. 266. 1764. The synonymy of the species is :

*S. guineense* L. Sp. Pl. 263. 1753.

*S. sempervirens* Mill. Gard. Dict. ed. 7, 127. 1768.

*Atropa solanacea* L. Mant. alt. 205. 1771.

*S. aggregatum* Jacq. Coll. IV. 126. 1790.

## II. By T. M. SALTER.

## OXALIS.

**O. argyrophylla** Salter nom. nov. vice *O. argentea* R. Knuth (Eng. Bot. Jahrb. 1927), a name which is invalidated by *O. argentea* E. & Z. (Enum. I (1836) n. 670). *O. argentea* R. Knuth is, however, identical with *O. falcata* Sond. var.  $\beta$  *callosa* (Flor. Cap. I. (1860) 323) and this plant is, in my opinion, deserving of the status of a separate species. The specimen *Drège*!, Zwartland, in Sonder's Herbarium at Stockholm should therefore be looked upon as the type of *O. argyrophylla*. The species is plentiful in Malmesbury Division and is not uncommon in the northern part of the Cape Peninsula.

**O. Sonderiana** (O. Kuntze) Salter nom. nov. (*type Zey.* 237 ! in Herb. Sond.) vice *O. minima* Sond. (Flor. Cap. I. 1860), a name rendered invalid by *O. minima* Steud. Nom. Bot. Ed. I. (1821) 579 and (Ruiz & Pav.) ex Don Syst. (1831). The specific name is adopted from *Acetosella Sonderiana* O. Kuntze Rev. Gen. I. (1891) 91. *O. minima* Sond. var. *alba* Salter Journ. S.A. Bot. II. (1936) 155 should therefore be named *O. Sonderiana* (O. Kuntze) Salter var. *alba*.

**O. orthopoda** Salter nom. nov. (*type Rust* 523 !, Berlin) vice *O. erecta* R. Knuth, Engl. Bot. Jahrb. LXI. Beibl. n. 139 (1927) 24, a name rendered invalid by *O. erecta* Savign. in Lam. Encycl. IV. (1797) 685.

## PELARGONIUM.

*P. plurisectum* Salter nom. nov. vice *P. multifidum* Harv. in Flor. Cap. I. (1860) 282, which is antedated by *P. multifidum* Hort. ex Hoffingg. Verz. Plf. (1824) 93.

## ASPARAGUS.

It has been known for some time that Baker's conception of the species *Asparagus stipulaceus* Lam., in the Flora Capensis Vol. VI, p. 264 is erroneous and judging from various notes and identifications on herbarium sheets, the discovery seems to have been first brought to light by the late Dr. C. E. Moss. The description in Flor. Cap. does not apply to *A. stipulaceus* Lam. but rather to *A. suaveolens* Burch., a very different species, which is incorrectly cited as a synonym and it is probable that all the specimens cited by Baker belong to the latter species.

*A. suaveolens* Burch. was figured in "Flowering Plants of South Africa," Vol. XI (1931), pl. 409, where there is a note to the effect that it had been confused with *A. stipulaceus*.

The true *A. stipulaceus* Lam. is a fairly common plant in the Cape Peninsula and specimens, e.g. Salter 8046A and B, recently sent to Paris, which Professor Humbert was good enough to have compared with the *type*, proved to be identical with it. At the same time, Miss W. F. Barker who kindly identified some of my specimens in England, found that this Peninsula plant (the true *A. stipulaceus*) was the same as *A. densus* (Soland) Baker—*type* in British Museum, which is therefore a synonym for *A. stipulaceus* Lam.

*A. stipulaceus* is very closely related to *A. capensis* L., having the same triple spines at the nodes. In both species the branches are formed by the elongation of the central spine and are constantly spine-tipped. The statement to the contrary in the key in the Flora Capensis is an error as may be seen from Jaequin's figure of *A. capensis* in Jacq. Hort. Schoenbr. t. 266. Lamarek's species differs from *A. capensis* in having larger flowers and longer cladodia and the erect stem is very shortly branched or even sometimes unbranched.

## ERICA.

It has been found that several of the names applied in the Flora Capensis, Vol. IV, to well-known Peninsula Heaths are either not the first names given to the species in question, or else are invalid owing to their having been previously employed for other plants.

*E. coccinea* L. *E. Petiveri* L. Diss. Erica (1785) 50 and Mant. Alt. (1771) 235, (Flor. Cap. No. 1) had previously been named *E. coccinea* by Linnaeus in Sp. Pl. I (1753) 355, but for some unknown reason he re-

named it later. In his original diagnosis of *E. coccinea* he describes the leaves as ternate, the tubular flowers as hanging down (dependens), with very long concolorous filaments, at the same time citing Seba Thes. I p. 32, t. 21, f. 4 (see reproduction), an unmistakable figure of the plant now generally known as *E. Petiveri* L.

By the rules of priority in nomenclature the name *E. coccinea* must be applied to this plant.

**E. abietina** L. Sp. Pl. I (1753) 355 is not the well-known yellow-flowered "Mealie Heath" with 4-nate leaves, referred to in Flora Capensis, No. 36, but the bright red-flowered plant, usually with 6-nate leaves, at present known as *E. coccinea* Berg. Pl. Cap. (1767) 92—non Linn. (Flor. Cap. No. 23). In his diagnosis Linnaeus describes the leaves as 5-nate or more, verticillate and the flowers as terminally congested, rich red (saturate rubris) and he cites Seba Thes. I, p. 31, t. 21, f. 1, an excellent figure of *E. coccinea* Berg. (see reproduction), which is, indeed, also cited by Bergius himself under that species. Seba's comparison of the leaves with those of *abies* (*abietis folio longiore et tenuiore*) probably suggested the specific name to Linnaeus.

The name *E. abietina* L. should therefore be applied to the red-flowered plant so common on Table Mountain and Devil's Peak.

**E. Patersonia** Andr. Coll. Heaths, t. 43 (published 1795) is the first name applied to the "Mealie Heath" (*E. abietina* of Flora Capensis, non Linn.). Andrews' original spelling was *Pattersonia*, but in three later instances he wrote it *Patersonia*, probably correcting a mere orthographic error.

Two collectors of this name were known to have been at the Cape in 1778; Lieutenant William Paterson, author of "Four Journeys into the Country of the Hottentots and Caffraria" and a Mr. Patterson (possibly misspelt), whom Thunberg refers to as "a mere gardener". According to Salisbury the plant was named after G. Paterson. As there is no very good evidence beyond Andrews' thrice repeated amendment, his corrected spelling is adopted here.

**E. phyllicaeifolia** Salisb. *E. purpurea* Andr. Col. Heaths (1795) 50 (Flor. Cap. No. 22) is an invalid name, the epithet *purpurea* having been previously employed for *E. purpurea* Thunb. Prod., Part I (1794) 71, a plant later transferred to the genus *Blaeria*.

The next valid name for *E. purpurea* Andr. is *E. phyllicaeifolia* Salisb. Trans. Linn. Soc. vi (1802) 364. Salisbury, who seems to have arbitrarily changed the original names of many of the heaths to suit his own taste, in this case actually cites Andrews' species.

The name *E. phyllicaeifolia* Salisb. should therefore be applied to *E. purpurea* Andr.



Reproduction of part of the figures in Seba's Thesaurus, Vol. I (1734), cited by Linnaeus in Species Plantarum I. Fig. 1. *Erica abietina* L. Fig. 4. *Erica coccinea* L. (Del. T. M. Salter.)

**E. canescens** Wendl. *E. pusilla* Salisb. Tr. Linn. Soc. vi (1802) 374 (Flor. Cap. No. 144) is an invalid name on account of the earlier *E. pusilla* Thunb. Prod. (1794) 70 (itself a synonym for *E. nudiflora* L.). The next valid name, *E. canescens* Wendl. Eric. Ic. 23, 171, t. 65 should be adopted for this plant, although it must be confessed that it seems to be little more than a variant of *E. parviflora* L.

**E. multumbellifera** Berg. *E. ramentacea* L. Mant. (Nov. 1767) 65, (Flor. Cap. No. 269) is an invalid name as it is antedated by *E. multumbellifera* Berg. Pl. Cap. (Sep. 1767) 110.

**E. ferrea** Berg. *E. mucosa* L. Mant. Alt. (1771) 232 (Flor. Cap. No. 270). In the opinion of Salisbury this species is conspecific with the earlier *E. ferrea* Berg. Pl. Cap. (1767) 112 and Bergius' full diagnosis could hardly apply to any other species. It should therefore take the name *E. ferrea* Berg.

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### III. By M. R. LEVYNS.

#### ATHRIXIA.

**A. crinita** (L.) Druce. In the list of plants growing on the Cape Peninsula, compiled by Bolus and Wolley-Dod, two species of *Athrixia* are given, *A. heterophylla* Less. and *A. capensis* Ker. The only character separating these species is the pappus which in *A. heterophylla* is said to consist of scales and bristles, while in *A. capensis* bristles only are found. A careful examination of large numbers of capitula from different plants growing on the lower slopes of Devil's Peak showed that these characters of the pappus have no diagnostic value at all. In some cases the pappus bristles are all alike, in others short bristles are found with the long ones, and in yet others the short bristles had become rather wide at the base, thus constituting the so-called scales. Variation in the pappus may even be observed in a single capitulum thus proving the futility of attempting to use the characters of the pappus in making specific distinctions.

In reducing these two species of *Athrixia* to one, a problem in nomenclature arises. The earliest name to be given to this plant was *Aster crinitus* L. (Amoen. Acad., p. 102). Thunberg upheld this species and added a new species *Aster heterophyllus*. The description of this new species was vague and it is impossible to know what plant Thunberg had in mind. Ker-Gawler constituted the genus *Athrixia* in 1823 and, evidently unaware that this plant had been described by Linnaeus, figured it and gave a full description under the name *Athrixia capensis*. A few



years later Lessing extended the genus and introduced the pappus differences that have been emphasised ever since. He recognised *Athrixia capensis* Kcr (= *Aster crinitus* Thunb.) and *Athrixia heterophylla* (= *Aster heterophyllus* Thunb. = *Aster crinitus* L.). These names were adopted by subsequent workers on the genus. In comparatively recent years a new combination, *Athrixia crinita*, was made by Druce for *Athrixia capensis* Ker, based upon *Aster crinitus* Thunb. non L.

As it is now clear that only one species is involved instead of two, the Linnaean authority is the correct one. As Druce made the appropriate combination it should be cited as *Athrixia crinita* (L.) Druce.

#### METALASIA.

***Metalasia brevifolia*** (Lam.) Levyns comb. nov.

In all recent systematic works this plant is cited as *M. fasciculata* Don. Linnaeus in the first edition of the Species Plantarum recognised it as a variety of *Gnaphalium muricatum*, and cited Burm. Rar. Afr. 223. t. 79. f. 3. This figure is a good one and leaves no doubt as to the plant thus named by Linnaeus. Bergius adopted Linnaeus' variety and gave it the varietal name of *fasciculatum*. This was later raised to specific rank by Thunberg as *Gnaphalium fasciculatum*. However, prior to Thunberg's publication, Lamarck had named this plant *Gnaphalium brevifolium* (Dict. II, 744, 1786). As Lamarck cited the same figure of Burmann there is no doubt as to the identity of his species which antedates that of Thunberg. It is therefore necessary to make the new combination *Metalasia brevifolia*.

#### BRYOMORPHE.

***Bryomorphe lycopodioides*** (Sch. Bip.) Levyns comb. nov. The monotypic genus *Bryomorphe* was founded by Harvey in 1863 (Thes. Cap. II, 33. t. 151). The name *B. Zeyheri* was given by Harvey in spite of the fact that two earlier names existed, viz. *Klenzlea lycopodioides* Sch. Bip. (1843) and *Helichrysum aretioides* Turcz. (1851). There seems to be no doubt that all three names apply to the same plant, consequently the correct name is *Bryomorphe lycopodioides*.

#### TRIPTERIS.

***Tripteris monstrosa*** (Burm. f.) Levyns comb. nov.

This name appears to be the correct one for the plant at present known as *Tripteris clandestina* Less. Lessing's description was based on a specimen in Thunberg's herbarium and was published in 1831.

In 1768 however, N. L. Burman (Prod. Pl. Cap. 28) had described the same plant as *Calendula monstrosa*. De Candolle (Prod. VI. 458. 1837) treated this name as a synonym of his newly created *Tripteris scariosa* which was later rightly placed by Harvey under *T. clandestina*, a highly variable species. It therefore follows that *Calendula monstrosa* Burm. f. is a synonym of *T. clandestina* Less. and as *monstrosa* is the earlier name it must be adopted.

#### ARCTOTHECA.

##### **Arctotheca Calendula** (L.) Levyns comb. nov.

The specific name of the common Cape plant which has been generally known as *Cryptostemma calendulaceum* R. Br. was based on *Arctotis calendulaceum* Jacq. This name, however, is antedated by *Arctotis Calendula* L. (Sp. Pl. ed. 1. 922) which is clearly the same plant. In 1917 Druce (Rep. Bot. Ex. Cl. Brit. Is.) made the combination *Cryptostemma Calendula*. Lewin (Fedde Rep. Sp. Nov. Beih. XI. 1922) brought forward evidence to show that the separation of *Arctotheca* and *Cryptostemma* was unsound, and as *Arctotheca* is the older name, he sank the species of *Cryptostemma* in that. Unfortunately he made the incorrect combination *Arctotheca calendulaceum*, so it now becomes necessary to make yet a further new combination.

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#### IV. By E. P. PHILLIPS.

#### HYPOCALYPTUS.

**Hypocalyptus oxalidifolia** (Sims) Phillips nov. comb. When examining the genera of the *Leguminosae* I was struck with the similarity of the two genera *Hypocalyptus* Thunb. and *Loddigesia* Sims. Both are endemic and have one species each. The distribution is similar. In both genera the shape and texture of the calyx is similar; in both the calyx is deeply intruse at the base; in both the staminal-tube is closed and the pod thickened on the upper suture; the leaves are similar in texture and venation and fold back on the mid-rib. There is no character on which the two genera can be separated. I, therefore, propose to sink the genus *Loddigesia* Sims under *Hypocalyptus* Thunb. and this involves the consequent change of name of *Loddigesia oxalidifolia* Sims to *Hypocalyptus oxalidifolia* (Sims) Phillips.



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## ERRATA.

## VOL. VIII.

- p. 203 : 12th line from bottom.—*For eight read sixteen.*  
9th line from bottom.—*For seventh read fifteenth.*
- p. 211 : 7th line from bottom.—*Interchange Bitterfontein and Garies.*







